JAN 2 2 1937

MOTOR AGE

CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

JANUARY
1937

IN THIS ISSUE

Off To A Flying Start

To help make 1937 a Prosperous New Year—Motor Age comes to you packed with pages of up-to-date and practical information that can be used every day in your shop. Resolve to read Motor Age from cover to cover every month and 1937 will be a year of progress and profit.

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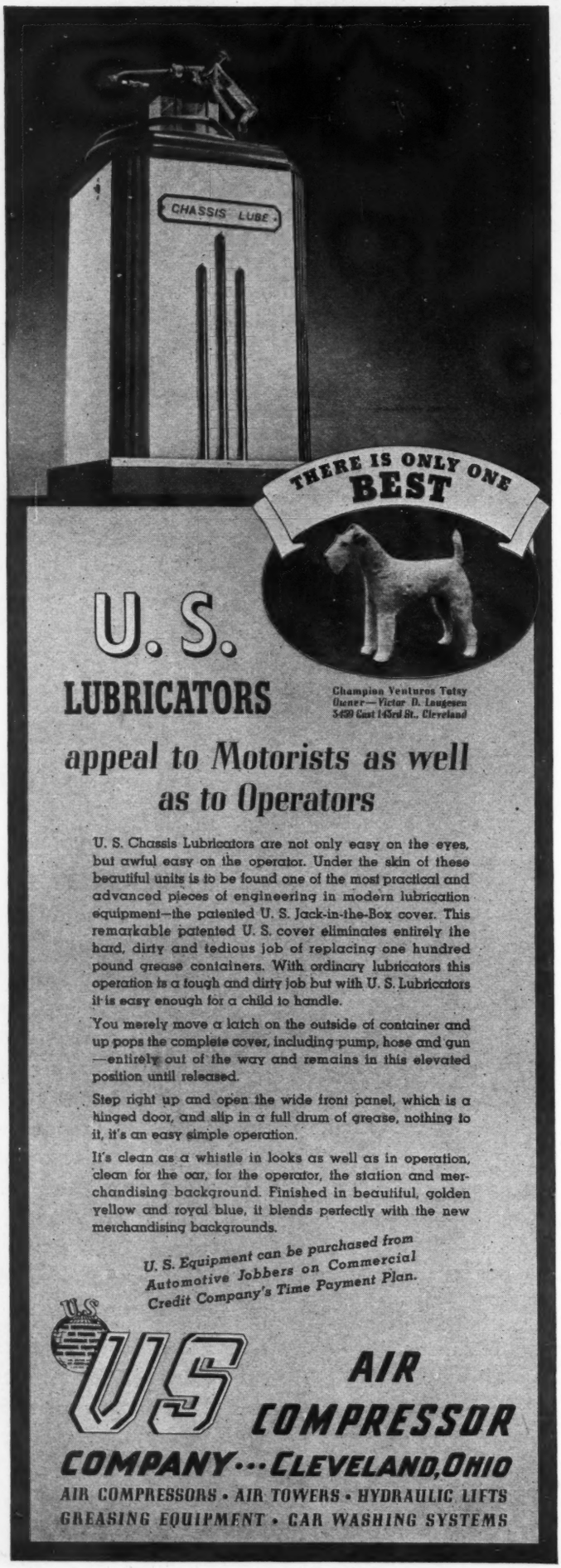
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MOTOR AGE

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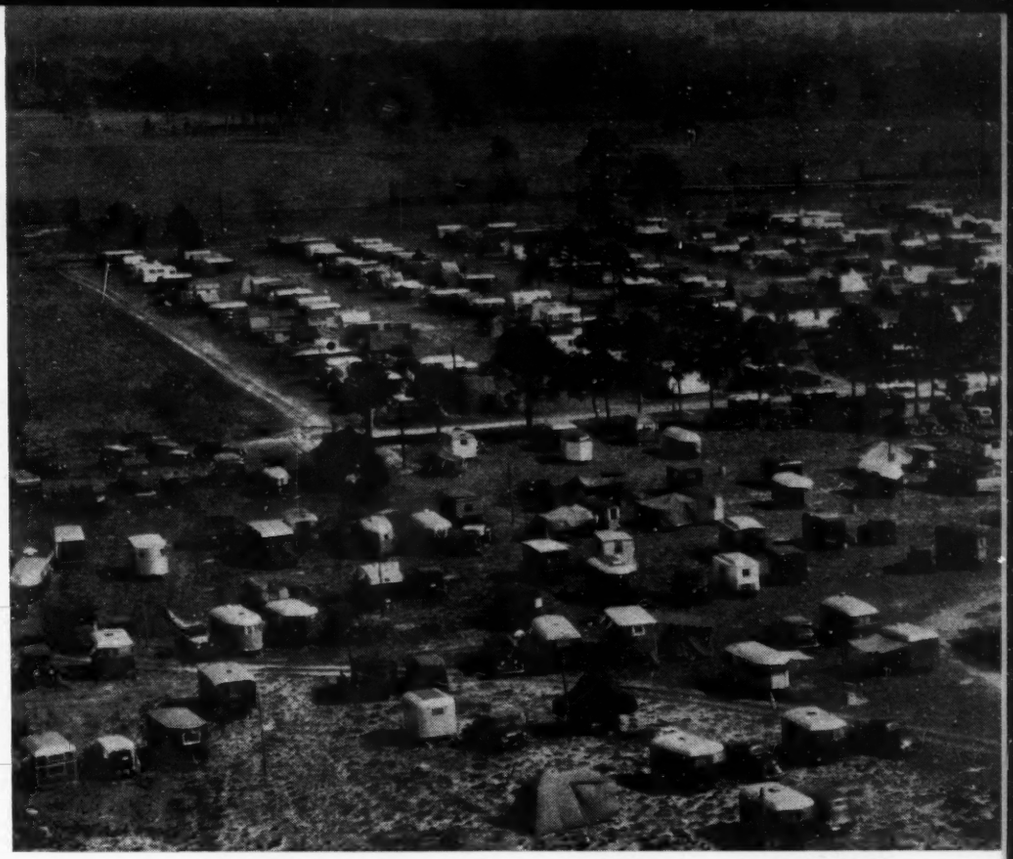


SHOP TALK

Bill Toboldt

FROM Evans Bunker of the Seattle Division of the A.M.A. comes word that they have adopted the Chilton Flat Rate and Tune-up Manual as the recommended guide of minimum prices for its members. The A.M.A. has completed negotiations with the Auto Mechanics Union of Seattle, and all mechanics are to receive a minimum of $1.00 per hour with a guarantee of $35.00 per week. . . . On that basis they will have to charge their customers nearly $3.00 per hour to get to first base.

▼

WITH approximately 250,000 registered trailers in operation in the United States, some of them will soon be finding their way to repair shops for first aid of some sort. A good deal of the service will be on springs and couplings, but shops on main highways will undoubtedly have the chance of seeing what they can do to fix an ice box that won't freeze or a stove that won't heat.

I wonder how you would repair sagging bed springs?

▼

JUDGING by the reports of sales of shop equipment at the A.S.I. show in Chicago, shops that are under equipped or are struggling along with defective or obsolete equipment are going to have even a tougher time than before in making a profit. Equipment sales are higher than ever before, and . . . profits come to the well equipped shop.

▼

AND it is well to be prepared for a good year. Cars sold during 1934 and 1935 are now in need of some real maintenance. In 1934, over 1,888,000 cars were sold; in 1935, over 2,743,000 cars. The 1934 figure is the highest since 1931, while we have to go back to 1929 to find a figure that exceeds the 1935 sales. There is no doubt that 1937 will be a banner year for the automotive repair industry.

▼

DON'T forget that all shop owners that employ one or more men are subject to the old age pension taxes, furthermore if he employs more than eight persons he must also pay the unemployment insurance tax which went into effect a year ago. The rate of the old age pension tax is 1 per cent. That is, the employer pays 1 per cent and also deducts an equal amount from the employee's salary, making a total of 2 per cent that the employer pays each month to the government. After the year 1939 the rate is increased.

Stop That Poison

Rolling "Lethal Chambers" Can Be Corrected By Proper Service on the Engine Exhaust System

POISON gas is one of the horrors of modern warfare. Nations in their so-called disarmament conferences have tried to eliminate this lethal weapon without success and knowing what is before them, provide their soldiers and often the civilian population with gas masks.

The driver of a car or truck with a defective exhaust system doesn't have a gas mask even though the atmosphere, in which he works is just as deadly as a modern battlefield drenched with poison gas or the lethal chamber used by some states in executing prisoners. Such drivers not only run the chance of killing themselves but also pedestrians or the occupants of other cars and trucks which might have the misfortune to be in his way when the lethal carbon monoxide from the engine exhaust system numbs his senses and destroys his judgment before it actually kills him.

During the past years there has been a lot of talk about safety and as a result driving tests have been improved and brakes, lights, steering, vision and signals have been more carefully inspected and serviced. But, even though the condition of these parts are perfect and the best of drivers is at the wheel, a crack-up will result if the poison gas leakage from the exhaust system finds its way into the interior of the car and kills the driver or dopes him into unconsciousness.

Eliminating defective exhaust systems will save lives and also pay good profits to the repair shop that does the job. Exhaust systems may be defective as the result of clogging or leaks. In many cases both will be found present in the same system. The illustration shows the main points to be checked when examining an exhaust system.

Probably the easiest method of checking for leaks is to run some kerosene through the carburetor. Then with the tail pipe partly obstructed, smoke will be forced out of any holes that may be present. In this connection, the entire system, from the engine to the tail

Exhaust Gas Attack

By Bill Toboldt

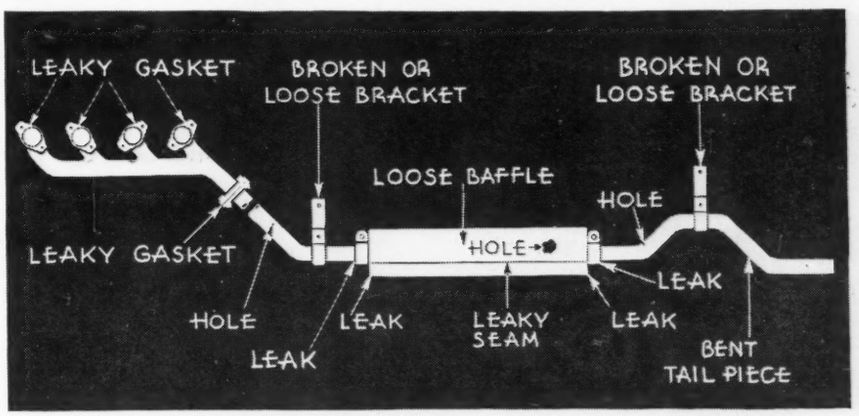
The tail pipe is also subject to rusting through and leaks. Equally important is to examine the tail pipe for dents or kinks that would obstruct the free flow of gas. In cases of extreme clogging, there will be a hissing noise and a loss in top speed. Vacuum gages can also be used to check for a clogged system. When making such a test, the throttle is quickly opened, which will cause the reading to drop. Then when the throttle is quickly closed, the reading should return quickly to its original value. If the system is clogged, the needle will not return as quickly.

In addition to checking the entire exhaust system, carburetors should be accurately adjusted in order to get complete combustion and in that way keep the amount of carbon monoxide at a minimum.

When checking or repairing exhaust systems, it is important to remember that there is more to the system than just the muffler. The exhaust manifold, exhaust pipe, muffler and tail pipe, all go to form the system along with the necessary gaskets, connections and supporting members. All should be checked and those found defective replaced.

pipe should be carefully inspected. The lower surface of the muffler in particular should also be carefully examined for rusting through. Any suspicious spots should be tapped to make sure that there is solid metal present and not just rust.

Another test is to accelerate the engine sharply several times while another mechanic listens carefully for loose baffles within the muffler, or other looseness in the system. Also strike the muffler with a mallet and listen for loose baffles or other loose parts.



Illustrating the points to examine for stoppage and leaks, in a typical exhaust system. It can be checked by means of a vacuum gage to determine back pressure and kerosene can be "run" through the carburetor, then by partly blocking the tail pipe smoke will issue from the leaks. Visual examination will disclose any kinks.

Photo from "The Great Ziegfeld," courtesy M-G-M

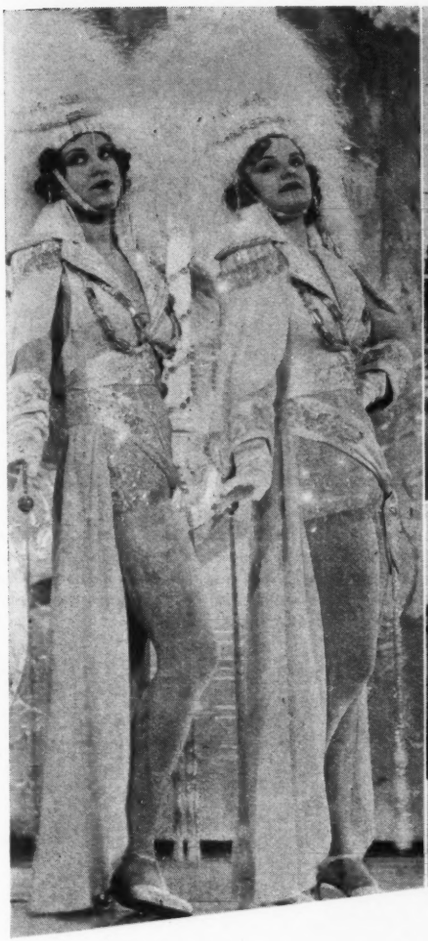
Glorifying the American

As Ziegfeld's Press Agent Might Have Said It, "Colossal - Stupendous - Gigantic" Were the Results Achieved When This Service Station Decided To Put Its Best Foot Forward

IT'S a far cry from the front row of a "Follies" chorus to the front row of gasoline pumps in the modern American service station — *but* — both can be sufficiently "glorified" to attract plenty of customers. What's more, the "dumb Dora" type of service station gets fewer and fewer service customers because nobody loves a shop with that grease-splattered complexion.

A face lifting operation performed on the service station of Shook & Fletcher Supply Co. of Birmingham, Ala., resulted in a 100 per cent increase in business. The chief objects sought in the remodeling was to make the place more visible to passing trade and to make it more easily accessible to motorists when they do drive in. New equipment was also added.

"Our station was erected back during the building boom and although imposing enough was hard to get into," said H. A. Bowron, manager of the Shook & Fletcher's service station. "The builder apparently knowing nothing about service station merchandising cluttered up the service floor with a dozen massive columns apparently put there in an effort to achieve architectural effect but which were eyesores, nevertheless. A motorist driving into the station had to play hide and seek with these pier-like obstructions which almost concealed the pumps from view. In fact a customer could only enter from a certain angle, and then he



Super Service

By George H. Watson

was more likely than not to hook a hub cap on a protruding wall.

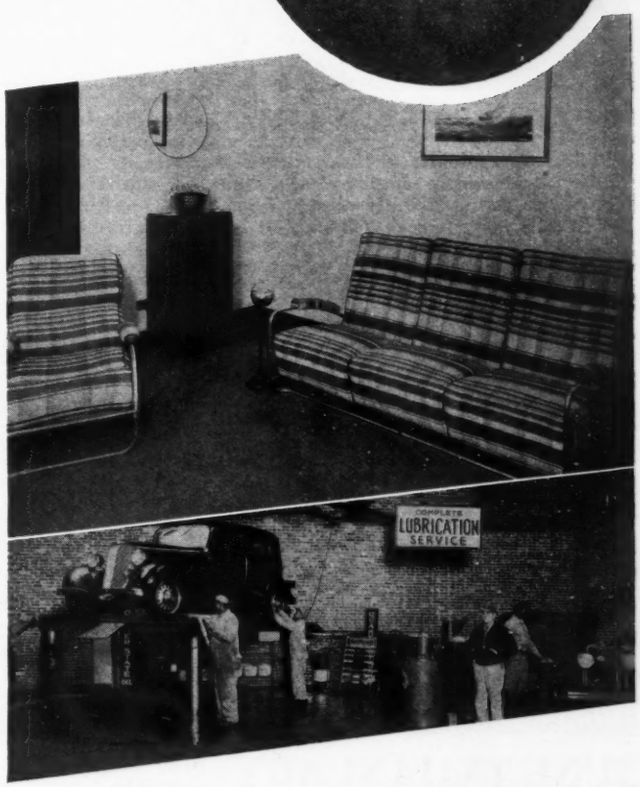
"So we remodeled and eliminated all these obstructions and made one smooth service floor with only an umbrella-type canopy over the pump island. This permits a customer to enter from most any angle and get out again without the need of a slide rule and compass.

"The tops and sides of the pump island shed are used to carry names of the products handled, with indirect lighting placed back of the flashed opal glass panels. Instead of the manually operated pumps we have four of the computing type which have more than paid for themselves in the past 12 months.

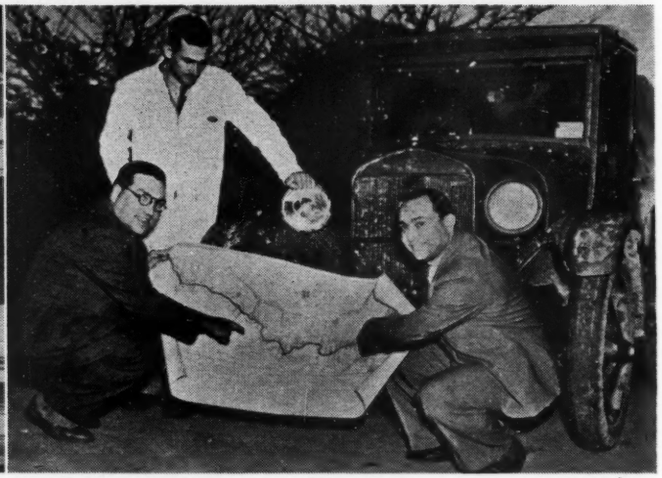
"Perhaps there are other automotive service stations which are losing business because their places are not laid out properly. With travel faster and traffic heavier on city streets, a motorist picks the station that is easy to get in and out of. Our place has been improved 100 per cent in this respect. With obstructions removed our service crew has a clearer vision of all entrances and can be ready to serve customers, even before their cars come to a stop.

"In remodeling we added a modern air conditioned rest room and lounge, with rugs on the floor, draperies

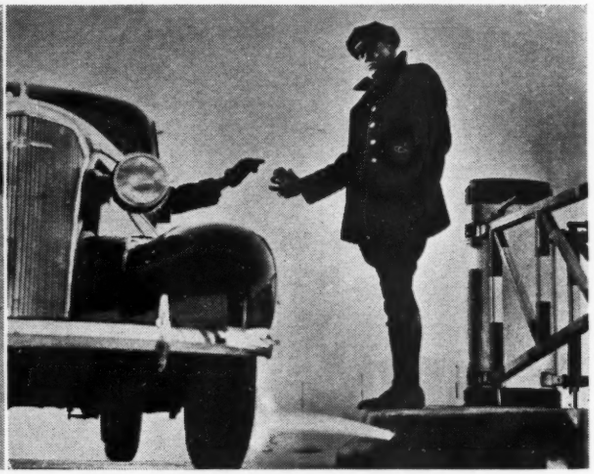
(Continued on page 66)



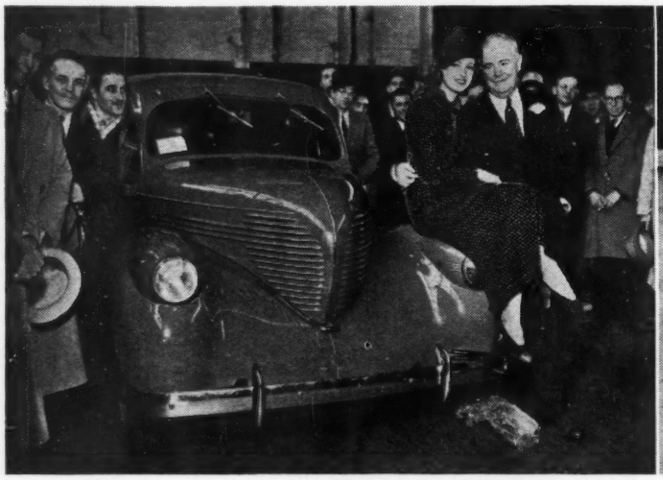
Before and After the "glorification" which included a new facade, air-conditioned rest rooms and a fully equipped shop



HIRE A HORSE In Bermuda, where autos are scarcer than make-and-break ignition systems, this bus (left) arrived for use on a private road between one of the hotels and the beach. "The law" insisted that it be towed over public highways until it reached final destination. (Right) Model T accomplishment. These three explorers are shown on their arrival at Dallas, Tex., after linking North and South America by automobile travel, for the first time in history. Their journey from Rio De Janeiro, Brazil, required more than eight years over obstacles and perils encountered in the jungles of South and Central America.



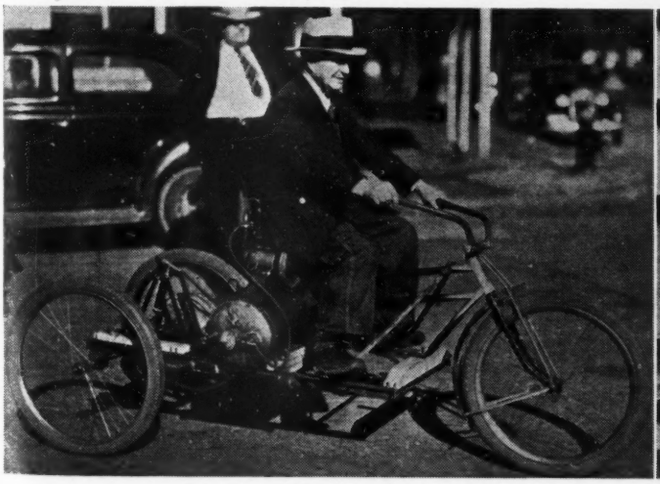
BLOND MECHANIC Miss Virginia Carabine (left) of Port Arthur, Tex., is a full fledged automobile mechanic, drives a Ford truck over a 45-mile territory about Port Arthur selling Ford parts wholesale to independent garagemen. The center picture isn't really a streamlined fire-plug, it's another of those ultramodern motorcycles. (Right) A squirting machine shoots water at the tires of a car at the bridge toll booth. The water grounds static electricity produced by the car after speeding over the bridge, thus eliminating the possibility of shock felt by both driver and toll collector, when a coin changes hands.



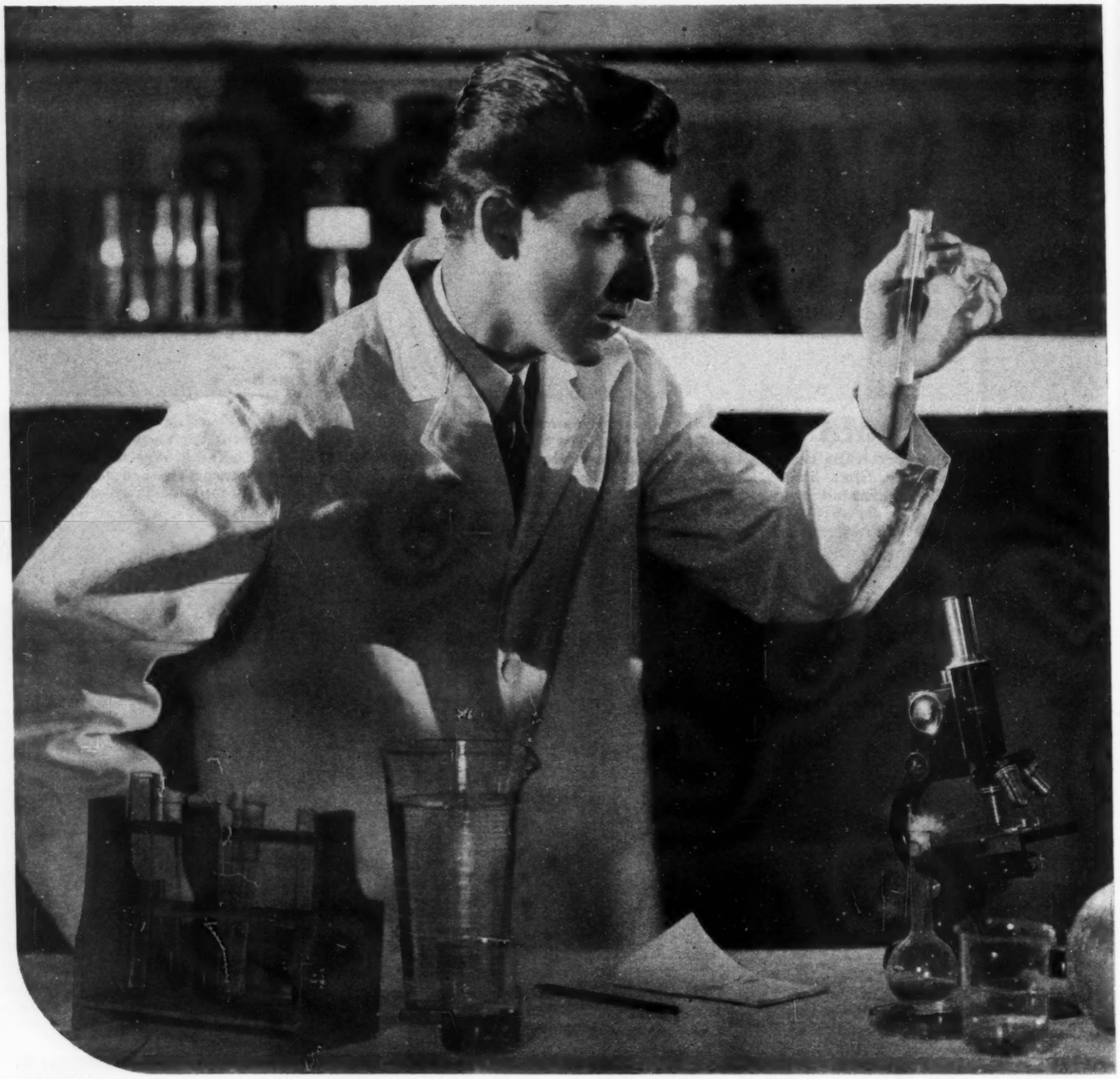
JUNE IN JANUARY June Lang, movie star, early in January received the first Willys car to clear the assembly line of Willys-Overland's new Pacific Coast plant. David R. Wilson, president of the company, made the presentation. Photo on left shows Miss Lang, Mr. Wilson and the 1937 Willys. (Right) Four lovely ladies in the "Gold Diggers of 1937" who have been sharing a community automobile received license tag No. "1937" in the state of New York. All four think it's lucky, or peachy, or something.

REUNION IN MANILA Ancient and modern transportation meet on the roads leading to Manila in the Philippines. On the left, a tourist in his modern motor car stops to watch the slow progress of the cart train bearing baskets from the villages to the metropolis. (Right) Mickey Mouse delights little patients in a Manchester, Eng., hospital. When Walt Disney was asked permission to use his character on a new ambulance, he not only granted it but furnished the designs with which the inside as well as the outside is covered.

WHITE STRIPE AND ORIGINATOR Edward N. Hines, for many years road commissioner of Wayne County, Mich., is the originator of the safety stripe, now almost universally used as a center-of-the-road traffic guide. He is shown on the left with the plaque presented to him recently by the B. F. Goodrich Co. in recognition of his contribution to national safety. (Right) Wavy white lines are now being used to warn motorists that they are approaching a dangerous intersection or curve. Motorists and traffic engineers alike have hailed this new safety innovation.



GIVE 'IM AIR and he'll show you how to run his new "contraption" (left). C. T. Hunt, of Springfield, Mo., has developed an engine to operate on air. He intends to build a six cylinder job on the same idea, the main feature of which will be the replacement of the springs on the car chassis by air compressors to generate power for the engine. (Right) Dr. O. E. May, U. S. Dept. of Agriculture chemist, with automobile parts and other products made from soy beans. The department will continue its study of the product in the hope of finding additional uses for the lowly soy bean.



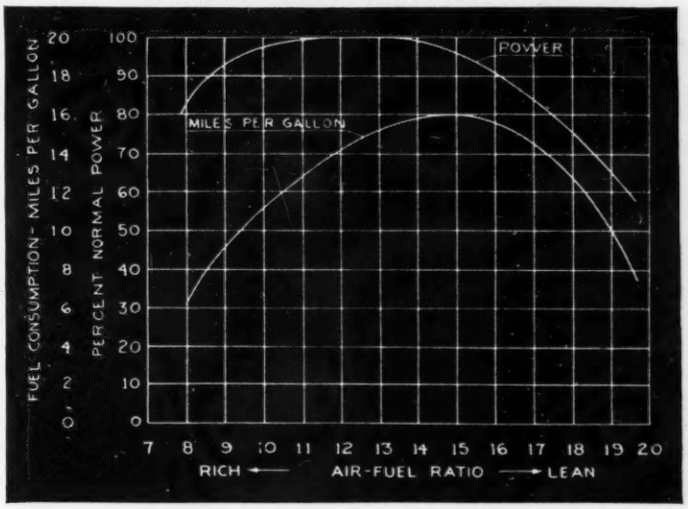
Analyze Exhaust

Without Being A Chemist

IT doesn't require a chemist, with his test tubes and such, to tell that so many cars running around the streets with "halitosis" have something wrong with them. But it does take good equipment, and a mechanic who knows what it is all about, to tell just what is wrong and how to correct it.

Tuning engines and adjusting carburetors has always been a job for the mechanic who has what it takes, but modern equipment has done a lot toward taking the guesswork out of the operation and placing it on a more scientific and accurate basis. Prominent among the items of modern equipment is the exhaust gas analyzer which permits a more accurate adjustment of the carburetor by making an analysis of the various chemicals or gases that form the exhaust, thus indicating the point at which maximum power and economy is obtained.

To simplify reading the dial,



Curves showing the relation between air-fuel ratio and power and fuel consumption

Gases

By Robert Hankinson

most exhaust analyzers are calibrated to read "Lean," "Normal," and "Rich." Others have dials reading from 50 to 100 per cent, meaning efficiency of combustion, and still others have dials reading from Zero to 15, meaning the air-fuel ratio. The desirable reading is between 12½ to 13½, which means that that amount of air in pounds has been found to be the air ratio to one pound of gasoline that will provide combustion that will be the most economical without sacrificing power.

If the reading obtained from the instrument indicates that the mixture is too lean, it does not necessarily mean that the fault lies with the carburetor—there may be leaking valves, a leaking exhaust line or a leaking intake manifold. When the reading indicates that the mixture is too rich, the engine is not completely burning the charge. That is the reason why the mechanic must use his head as well as his hands when taking an exhaust gas reading. No radical changes in the carburetor adjustment should be made until he is sure that the difficulty cannot be traced to some other cause. If he disregards these possible causes and adjusts the carburetor too lean, trouble with burned valves, bad spark plugs and excessive cylinder wear is quite apt to result, and the slight saving in fuel bills will be more than lost in the cost of repairs made necessary by this adjustment.

Theoretically, 15 pounds of air are required for complete combustion of 1 pound of gasoline, but maximum power is developed when a somewhat richer mixture is used, which, as previously mentioned, is between 12½ and 13½ pounds of air to 1 pound of gasoline, giving about 77-86 per cent completeness of combustion. Not only is the power greater for slightly richer mixtures, but the possibility of burning valves and other engine difficulties is reduced or eliminated. It is generally advisable to adjust the carburetor to give about 80 per cent completeness of combustion.

Some mechanics say that the more cylinders an engine has, the richer the mixture must be so as to eliminate the possibility of any cylinder receiving insufficient fuel, due to difficulties in distributing the mixture evenly to all the cylinders. While this may be a little extreme, mechanics using exhaust gas analyzers should take such conditions into consideration, as it must be remembered that the analyzer shows the average for all cylinders, and some may be operating on a leaner mixture than others. Just another case of headwork.

When any doubt exists as to the quality of fuel distribution, indicated, for example, by the continued burning of valves in certain cylinders, it is advisable to remove the exhaust manifold and make an analysis of the exhaust coming from each exhaust port. In this way it can be definitely established whether a lean mixture is being delivered to certain cylinders, and then steps can be taken to bring about more equal distribution.

By
Frank G. Hetishee

"I'd Do It All Over Again..." *Ralph De Palma*

A Handful of Highlights On Auto Racing Past, Present and Future By One Who Spent 26 Years Behind The Wheel

MOCKING death for a living, and experiencing more thrills in an hour than the average individual has in a lifetime; such has been the life of Ralph De Palma, the grand old man of a thousand speed wars, who today, at 54, is as popular a driver as ever put a gloved hand to a steering wheel. Twenty-six years of strenuous competition, figuring in only three bad accidents, just one of which was a near fatality, find this naturalized Italian hale and hearty both in mind and body.

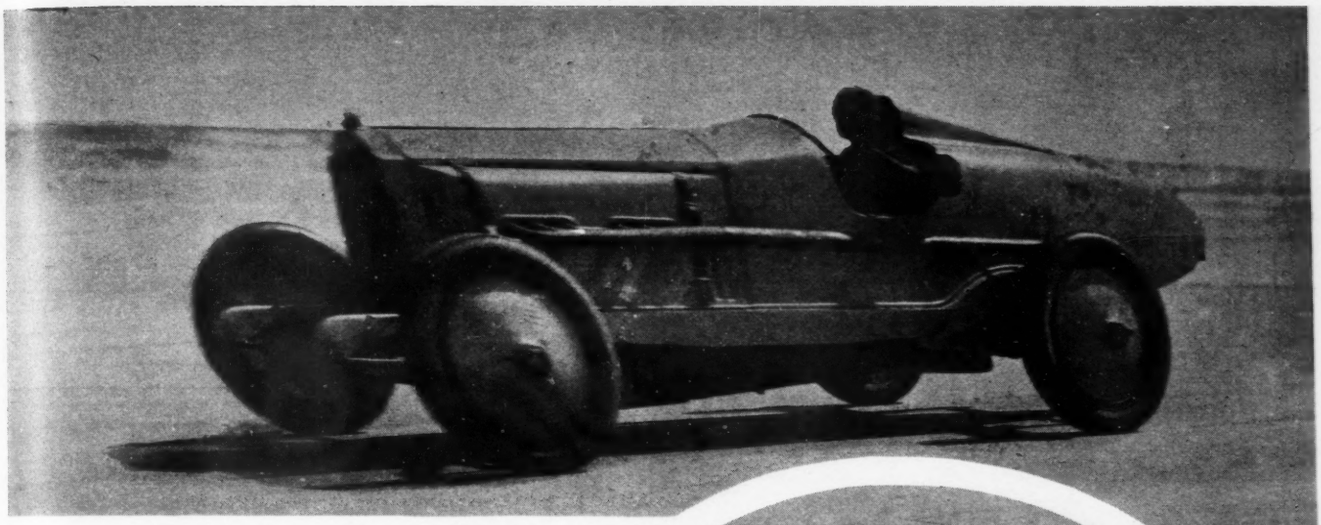
From 1907 through 1933 De Palma campaigned the road races both here and abroad, as well as on the rough bricks at Indianapolis, the timber saucers, and the dirt tracks. Today as he sits in his office at Lafayette, Ind., where he is a car dealer, the silver fox will tell you, "I'd do it all over again if it were possible; however, not all the boys were as fortunate to come through the game like I have.

"Yes, a lot of the old timers have left us. When the first 500-mile race was staged at Indianapolis, back in 1911, David Bruce Brown, Spencer Wishart, Bob Burman, Teddy Tetzlaff, and Howdy Wilcox were the high lights of the day, but that old man with the scythe waved the checkered flag on them. Unless you young fellows review your racing history those names won't mean much to you, but take it from me those boys were as good as they come.

"You know, this racing game is a fickle proposition, and the dice of the gods are always loaded. I'm certainly lucky not to be disfigured like some of the boys.

"I never figured in any spills where I got a crack over the head. Only in the last few years have crash helmets come into vogue, and we didn't use to have those steel football headgears. You know, there are a few of the old timers that haven't all their marbles together, and to me that is the most pathetic aspect of our racing game."

Ralph De Palma believes that drivers in general do not take their business as seriously today as formerly. The reason for this is partly because the various factories used to finance a team of cars which campaigned the major races during the season, and drivers were required to train and take their



As he was in the beginning. (Opposite page) Ralph DePalma, National Champion in 1912. As he is now, Ralph DePalma, Packard dealer. (Below) At the wheel of the Mercedes with which he won the Indianapolis Classic in 1915. (Bottom of page) Ready to gun the Duesenberg he handled in 1922.

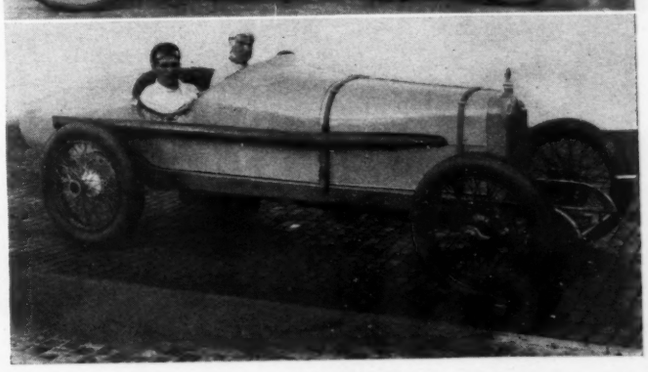
racing seriously. According to Ralph, there are only a half a dozen drivers today who conscientiously make their racing activities a business enterprise.

The veteran wheel twister still believes there is money to be made in racing providing a young man can finance his own car, but splitting prize money two or three ways with a car owner is not a paying proposition. However, the ever-smiling Ralph will tell his youthful confidants that auto racing is not a path of roses but a game of give-and-take, and always there is only one driver who can win any race even though every starter feels he is a sure fire winner.

De Palma ranks as one of the top flight race drivers of all time, and his Indianapolis achievements have still to be equalled, as he has traveled 4161 miles over the rough bricks. Louis Meyer, next in line, has 3885 miles to his credit, and Tony Gulotta has 3630 miles of driving on the Hoosier speedway. Both Meyer and Gulotta have a chance to surpass De Palma's record.

De Palma's triumphs on the early day road racing circuits, such as the Vanderbilt Cup, the Savannah road race, the Santa Monica,

(*Continued on page* 34)



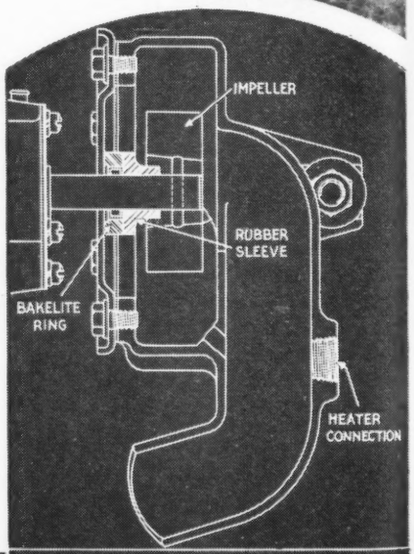
For a Perfect WATER SEAL *Use Proper* PUMP LUBRICATION

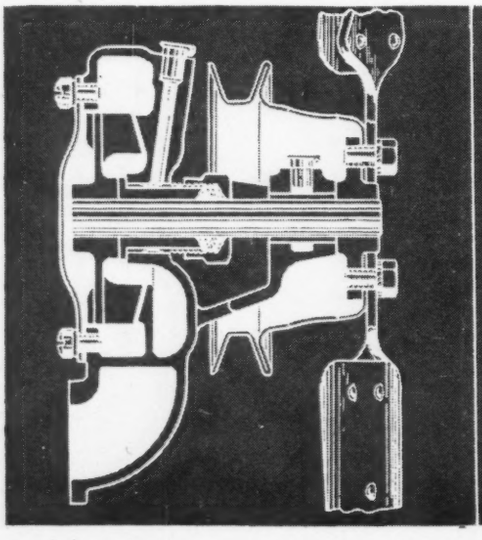
To Have or Not To Have — An Engine That Overheats Or a Pump That Leaks. That's the Question—and Here's the Answer.

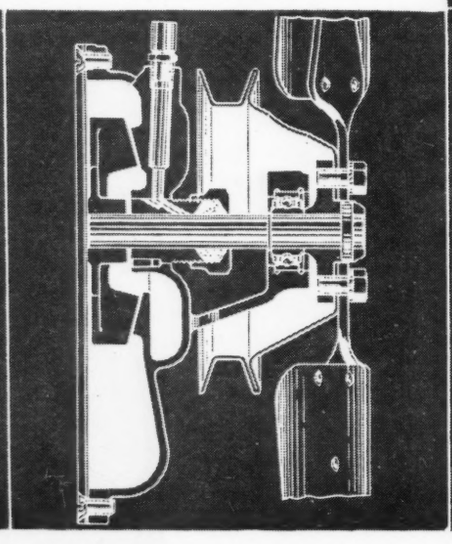
IF all the automobile radiators ruined last year were connected together in series and hooked up to Hades they would cool off the place so that the Devil would freeze. And if all the ruined water pumps were laid end to end they would reach from here to Hell. Of course, some of the radiators were ruined in collisions, but thousands of them were damaged or ruined by improper lubrication of the water pump. The difficulty comes from the fact that just because a lubricant manufacturer offers a water pump lubricant, the service man thinks it can be used on all types of pumps.

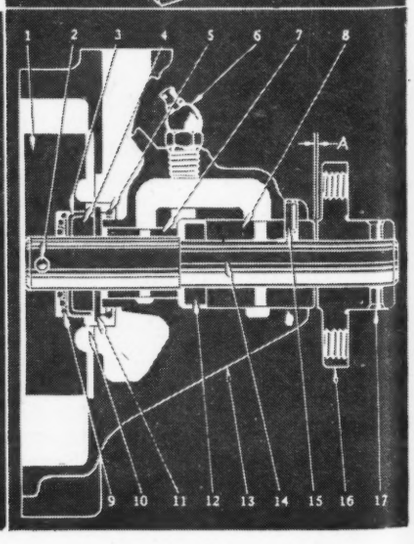
Correct lubrication of a water pump would appear to be a simple matter. Actually it is a very complex matter. Often it becomes a matter of compromise—in fact, the choosing of the lesser of two evils, the question being whether to have an engine that overheats or a pump that leaks. If the choice is made on behalf of the engine, a lubricant will be used that will not get in the cooling system. If the choice is made on behalf of the pump, a lubricant may be used that will make for a good water seal.

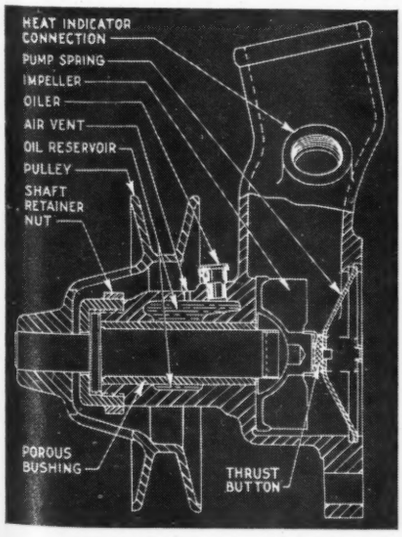
These twin evils do not raise their ugly heads on every automobile, but they do appear all too often. If water pump lubrication requirements were uniform it would be a simple matter to make a good lubricant. Or if water pump











lubricants were uniform it would be easy to design a good water pump. Unfortunately, neither possesses the slightest semblance of uniformity and the net result is chaos.

Current designs of water pumps run at high speed, and some of them are so designed that the hot water comes in contact with the lubricant, while in others it does not. Needle bearings, ball bearings, roller bearings and plain or fancy bushings are used on the pump shaft. Some pumps are equipped with packing glands of the compression type, others have spring loaded packing disks, and still others have rubber seals.

It is obvious from the foregoing that a water pump lubricant should possess several characteristics in order to be applicable for general use on all cars. It should:

A. Have a melting point higher than the maximum heat of the water in the cooling system with which it comes in contact in order to avoid becoming fluid.

B. Not break down or separate out when used in high-speed pumps equipped with anti-friction bearings.

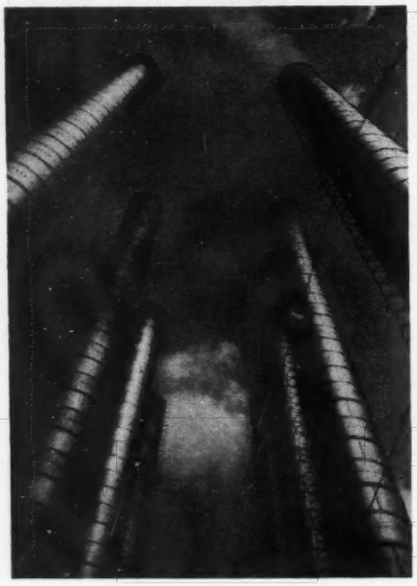
C. Possess lubricating value in order to avoid scoring of the pump shaft where compression packing glands are used.

D. Be insoluble in water (or anti-freeze solutions) in order to prevent the lubricant getting into the radiator.

E. Be soft enough to avoid interference with the spring-loaded packing devices.

F. Remain stable under all conditions of heat, speed and load to which it will be subjected.

(Continued on page 62)

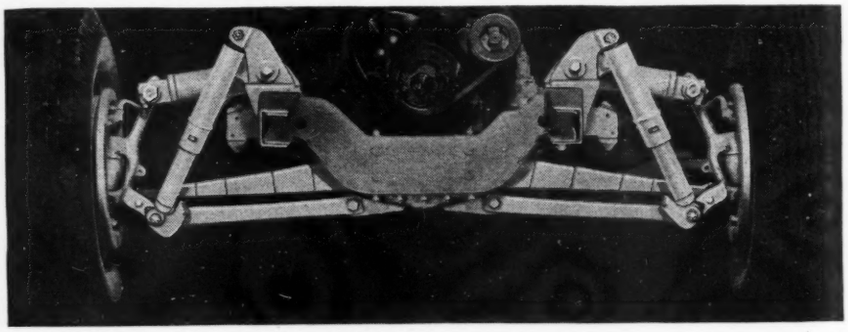


Service Hints

From the Factories

A GRUNTING noise in the front shock absorbers of the 1937 model Studebaker Dictator may be caused by the rubbers at either end of the shock absorber unit being misaligned. Loosen the retaining nut at the shock absorber end and allow the rubber bushing to rotate to its free position, and then tighten the nut.

A SPECIAL spring cover clip and bolt has been released by Pontiac to eliminate a rumble in the rear of the car caused by spring leaves slapping. Two clips are installed on each spring, midway between the axle and the ends of the spring, over the spring cover, and clamped tightly in place.

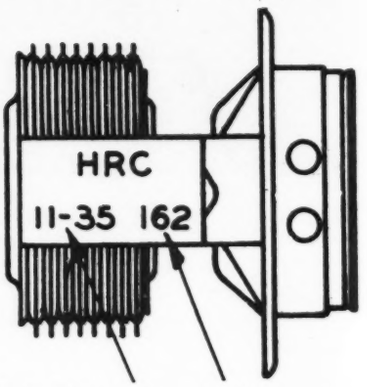


WHILE calcium chloride (which is a salt) has come into popular use by municipal and State Highway Departments to melt ice and snow on streets and highways, its continuous use during a long hard winter eventually has an injurious effect on the enamel finish of automobile fenders and other sheet metal parts.

J. H. Otis, Pontiac Motors' parts and accessories manager, has announced that all Pontiac dealers in the regions affected by winter's ice and snow will soon have at their disposal a rubber paint which can be sprayed or brushed onto the under sides of fenders and sheet metal aprons thus filling the pores of the finish and providing a surface which calcium chloride will not attack.

Mr. Otis also points out that the paint seals the filler strips between fenders and body where the calcium chloride usually seeps and eventually does its damage.

THE 1936 Ford V-8 used both aluminum and steel pistons, which necessitated a change in the cylinder head design. It is important that the correct head be used to correspond with the type of piston, as the head originally used with the aluminum piston job will not allow sufficient clearance for the piston if installed on an engine that is equipped with steel pistons. If the steel piston job head is installed on the aluminum piston job the compression ratio will be lowered and performance will be effected.



WHEN a hot water heater is installed in the 1936 Oldsmobile, a thermostat with the proper opening characteristics should be installed, depending upon the type of anti-freeze used by the owner. For an alcohol solution, a thermostat that opens at approximately 142 deg. F. should be used; if a permanent type of anti-freeze is used, a thermostat opening at approximately 162 deg. F. should be installed. Thermostats supplied by Oldsmobile have the opening temperature marked on the side of the thermostat.

"Those rear springs you sold me were punk"

THE installation of a special cylinder head gasket supplied through Oldsmobile dealers will be found to be effective in eliminating spark knock sometimes experienced with the 1935 Six and Eight cylinder Oldsmobile.

What is this—a strip tease?"

SELLING SERVICE

By Frank P. Tighe

These are practical merchandising ideas that have been used by maintenance men—just like yourself. Workable ideas gathered from here, there and everywhere and presented for practical and profitable business. Use them and write us your experiences for publication herein.

"Selling By Camera"

The *Duco-Dulux Refinisher News*, published by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., sends us this interesting sales promotion idea under the heading "Selling By Camera."

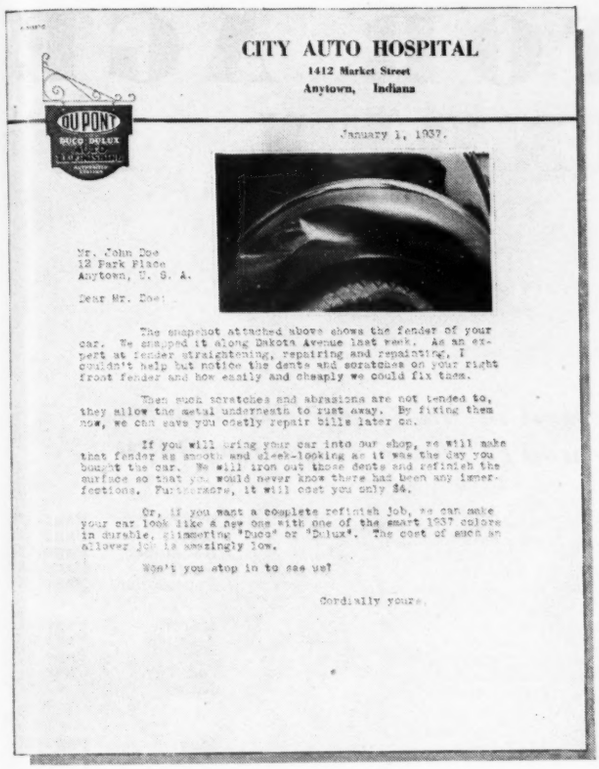
Any independent serviceman with a small-size camera and a yen to increase his business by the use of personalized direct mail advertising can make use of this clever business-getter.

The idea is simply this, take a small camera as you walk down a street lined with parked cars, or through a parking lot. Pay special attention to those cars with dented fenders, rusted hoods, scratched, scraped and faded finishes, or those needing any other job that can be clearly shown by means of a photograph. When you find one of these jobs, take a snapshot of it. Take the license number of the car, write down the number of places where the car needs service, whether it be body work, refinishing or any other job. This is for purposes of estimating later on.

Then, when the pictures are developed a day or so later, and you have looked up the name and address of your prospect, by means of his license number, write the owner a letter. In the letter, describe your services, and attach the snapshot you made of his car. Include in your letter an estimate for doing the job you have seen and photographed. The three pictures shown here, by courtesy of the du Pont Company, illustrate clearly the steps to be taken. They show the serviceman taking the picture, his results, and a suggested sales letter to the prospect selling a fender straightening and refinishing job.

Tie-in this profitable idea with your spring selling campaign. In this way, you can show your prospect where there is an immediate need for work on his car and also impress him with the fact that you are on the alert for his business.

Direct mail advertising pays best when ideas are fresh and stimulating.



CITY AUTO HOSPITAL
1412 Market Street
Anytown, Indiana

DU PONT DUCO DELUXE

January 1, 1937.

Mr. John Doe
12 Park Place
Anytown, U. S. A.

Dear Mr. Doe:

The snapshot attached above shows the fender of your car. We snapped it along Dakota Avenue last week. As an expert at fender straightening, repairing and repainting, I couldn't help but notice the dents and scratches on your right front fender and how easily and cheaply we could fix them.

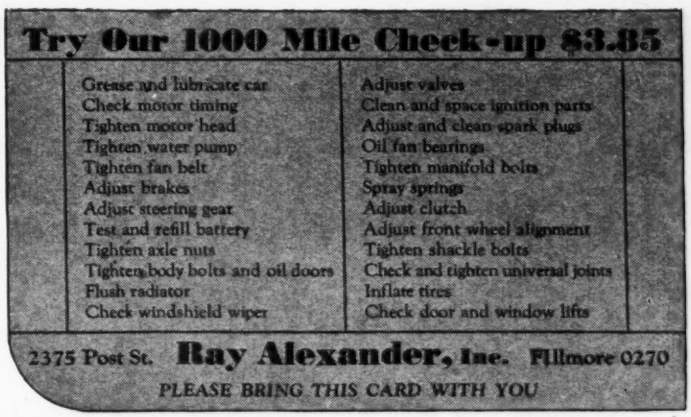
When such scratches and abrasions are not tended to, they allow the metal underneath to rust away. By fixing them now, we can save you costly repair bills later on.

If you will bring your car into our shop, we will make that fender as smooth and sleek-looking as it was the day you bought the car. We will iron out those dents and refinish the surface so that you would never know there had been any imperfections. Furthermore, it will cost you only $4.

Or, if you want a complete refinish job, we can make your car look like a new one with one of the smart 1937 colors in durable, glimmering 'Duco' or 'Dulux'. The cost of such an all-over job is amazingly low.

Won't you stop in to see us?

Cordially yours,



'Thousand-Mile Check-Up'

HERE is an idea in service selling that has brought in as much as $1,500, at a total selling expense of $5!

It is a "1000-Mile Check-Up" service which has been widely popularized by Ray Alexander, Inc., San Francisco, Cal., independent repair shop. He has made a regular feature of this service, which in addition to being profitable in itself has been a feeder for major repair jobs.

The "1000-Mile Check-Up" includes 24 operations and costs $3.85. However, Alexander has found that the check-up brings in an average of $10, represented by additional work, such as valve grinds, brake relines and other operations sold to the owner as a result of the thorough inspection.

To sell this service Alexander uses post-cards, which list the 24 operations involved, and the cost. He sends out 1500 cards at a time. His experience has been that at least 10 per cent of the prospects respond. As each car owner spends an average of $10. because of extra service sold, the total runs to about $1,500.

The printing cost is $3.50. He uses one cent postage, which totals $1.50 for each mailing, making the total cost only $5.

One of the reasons for the good response is that Alexander generally confines the mailing to his regular service customers, instead of using owner lists purchased for the purpose.

Another reason for the good response is that the operations included in the "1000-Mile Check-Up" appeal to every car owner. Some of the operations were formerly performed as free service, such as checking windshield wiper and testing and refilling batteries.

"We now charge for these services, as they are included in the service which we sell at the flat rate of $3.85," said Alexander. "However, it is interesting to state that the 24 operations included in the check-up were carefully selected. We made a check-up of our job sheets, and picked out those operations which in the past were most frequently performed for customers, some of them without charge.

"Still another reason for the success of the service is that we do the work thoroughly. It takes two hours to complete the 24 operations. The time is well spent, because it gives us the opportunity to thoroughly check the condition of the car, and thus interest the owner in necessary mechanical and body repairs."

Hung For Treachery

A display that is different and unusual attracts attention of passing motorists and implants a selling idea in the minds of prospects quicker than it takes to tell it. We all know that bad tires are treacherous, we've told that story hundreds of times . . . yet the Municipal Tire Co. of New York City hit upon an idea that scored an immediate success. They erected a scaffold in front of their garage, strung up an old tire, and over it they placed a sign, "Hung For Treachery." When customers got a glimpse of the gallows—they understood what salesmen were telling them all along—but they got the idea quicker and sales moved ahead at a better pace.

"I'd Do It All Over Again"

(*Continued from page 27*)

and the Elgin National, make him one of the masters of those thrilling hectic days prior to the World War. On the Continent, America's good-will racing ambassador is still remembered for his spectacular driving, and although he never won a Grand Prix he proved himself worthy as the New World's Speed King.

Likewise, intrepid Ralph was equally at home broadsliding on the dirt tracks at the various fairs and expositions throughout the land. During the early twenties, when the short lived board speedways were at their height, De Palma could always be found out in front early in the melee setting his habitual blistering pace. Ralph recently said that he never enjoyed driving on those wooden bowls, as it required no real skill. All that was necessary was a heavy right foot to open up and to hold her on that methodical groove. In fact, it struck him a bit boresome to negotiate those lightning fast boards, when anybody with a lead foot could sit in a cock pit and hold her down to 130 m.p.h. for a couple of hundred miles.

In spite of De Palma's enviable records, it is at Indianapolis that amiable Ralph will also be remembered for his gallantry in defeat. Back in 1912, De Palma immediately took command of the lead when the pacemaker set the field off to a flying start for the second annual 500-mile sweepstakes. For 198 laps he led the pack, breaking every existing speedway record up to 450 miles, when he settled down with a comfortable eight-lap lead. With victory in his grasp, his Mercedes broke a piston and went dead on the back stretch, and the tantalizing fortune vanished in thin air.

Lady Luck was with Hard-luck Ralph in 1915, in spite of a connecting rod that went through the crankcase of his Mercedes with two laps to go. Had Dario Resta realized De Palma's plight, the results might have been different; but, broken down, unnerved, and outdriven by the spectacular De Palma throughout the race, Resta was content to glide in for second money. De Palma won and his record of 89.84 m.p.h. stood unbroken for seven years.

The 1919 "500" found Ralph setting the pace in his big Packard for the first half of the race, but after a lengthy pit delay the idol of the day fell back to tenth place. What was De Palma's loss was Howdy Wilcox's gain, for Wilcox snatched the race after trailing the leaders, and the best Ralph could annex was sixth. Fire played havoc with De Palma's car in the 1920 race, when flames enveloped his Ballot within the last 30 miles of a well deserved victory. Such was De Palma's luck, but a lack of alibis was Ralph's outstanding characteristic.

MOTOR AGE INDEX

A Handy Digest of All Important Articles Which Appeared In Motor Age During 1936

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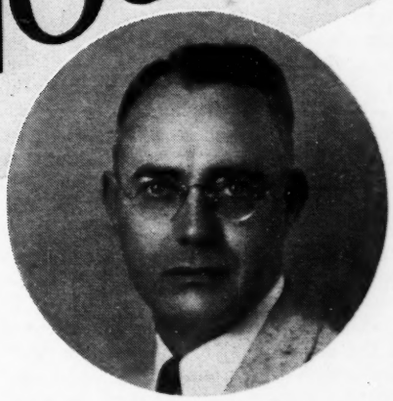
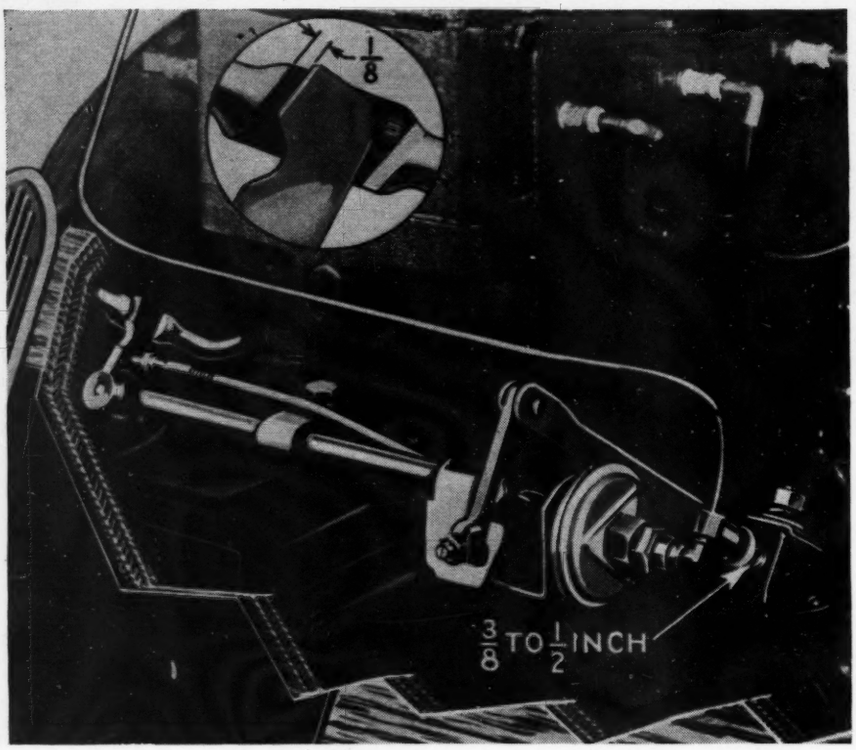
The READERS' CLEARING HOUSE



THIS department is written by the readers of Motor Age themselves! It presents their questions, their problems together with the practical analysis of the difficulties and replies from Bill Toboldt (left), editor of Motor Age and "Hank" Hankinson (right), technical editor. Read the Clearing House—then write us!



Automatic Throttle Opening Linkage

Engine Tune-Up Makes Starting Easy

Will you please let me know the points to check to overcome some trouble I am having with a 1936 Chevrolet. It is hard to start when it is cold. Michael Balint, Mike's Auto Repair, 2815 Main St., Vancouver, Wash.

LET us review, briefly, the points of an engine tune-up as applied to this model so that you will be able to check back over the work you have done and possibly discover points that you have overlooked. A compression test should be made first and each cylinder should show a minimum compression of 90 lb. There should not be a difference in compression reading greater than 5 to 10 lb. between each cylinder. If such a condition does exist, it means that the valves are either burned or sticking or are improperly adjusted, that there is a leaking cylinder head gasket, poorly fitted rings or worn cylinders. Naturally, these conditions will have to be corrected before the engine can be successfully tuned.

One point that is often overlooked is the adjustment of the throttle opening which is automatically controlled by the starterator linkage. In other words, when the accelerator pedal is depressed to start the engine, the throttle should be open before the starter turns the engine. This is accomplished by adjusting the starterator control to provide ⅜ to ½ in. free travel between the ends of the starterator link and the starter switch spring seat. After this adjustment has been made, a further adjustment should be made of the starterator lever in the notch cut in the accelerator rod. There should be a clearance of ⅛ in. between the starterator lever and the top of the slot or notch in the accelerator rod. This adjustment is very important particularly in cases of hard starting.

The spark plug gap should be adjusted to 0.032 to 0.035 in. Breaker points should be set to a clearance of 0.018 in. Ignition timing should be set with the octane selector at zero. Number one spark plug fires when the steel ball in the flywheel lines up with the pointer on the flywheel housing. This is adjusted, of course, by loosening the distributor clamp and rotating the distributor body to the proper position.

Intake valves should be lashed to 0.007 in. clearance and exhaust valves lashed to 0.014 in. with the engine hot.

I believe if you will go over these points and, of course, adjust the carburetor after the above items have been checked and adjusted, you will experience no difficulty because of hard starting. One point in the carburetor that should be carefully checked is the float level. This should be ⅜ of an in. from the outer ends of the float to the machined surface of the cover with the gasket removed.

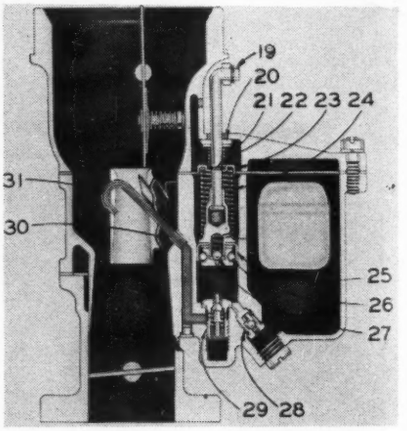
Finally, check all of the electrical connections, paying particular attention to battery and ground connections. Also, use light engine oil, either 10W or 20W.

Unusual Noise When Starting Cold Engine

During the past month I have had two cases of a peculiar noise when starting the engine of 1935 model Ford V-8 cars. This noise is very much like that caused by the clutch slipping. It lasts only a second, and occurs only when the engine is cold. Being unable to produce the noise at will, I am at a loss to know just what to look for because it doesn't last long enough for me to get out of the car and around to the engine.

If you can give me any suggestions as to the possible cause of this condition I will greatly appreciate hearing from you. A Pennsylvania Subscriber.

THIS noise is caused by the poppet valve in the carburetor choke valve. You will notice that the choke valve has built into it a small valve and shaft or pin, and that the valve is held in place against the choke valve by a spring. When you close the choke to start the cold engine the air supply would be entirely shut off if it were not for this little poppet valve,



and there would be the danger of over-choking the engine. When the engine starts to turn over, the suction developed opens this poppet valve, admitting a small amount of air. If the battery is in good condition so that the engine spins over rapidly, the poppet valve opens and closes very quickly, and the noise you hear is this little valve chattering against the choke valve.

The reason you do not hear the noise longer is that you push the choke in just as soon as the engine fires, and when starting a warm engine you do not use the choke at all.

Knock in Brakes Caused by Adjustment

I would like to ask you if you could give a solution for a problem I have with a set of brakes on a Lafayette-Nash car, 1936. The trouble is that when you start to push the brake

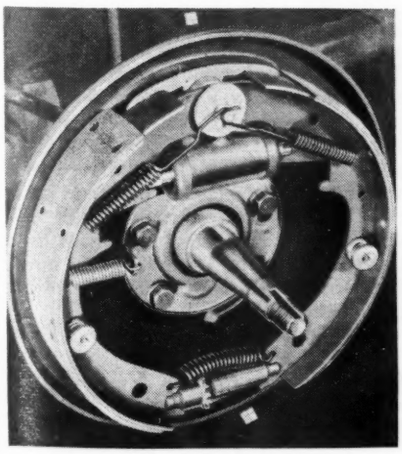
pedal to stop, you hear a knock as though the brake shoe is winding up and when the shoe gets hold, it is quiet.

If you have any dope on these brakes on this particular car, I would appreciate your information.

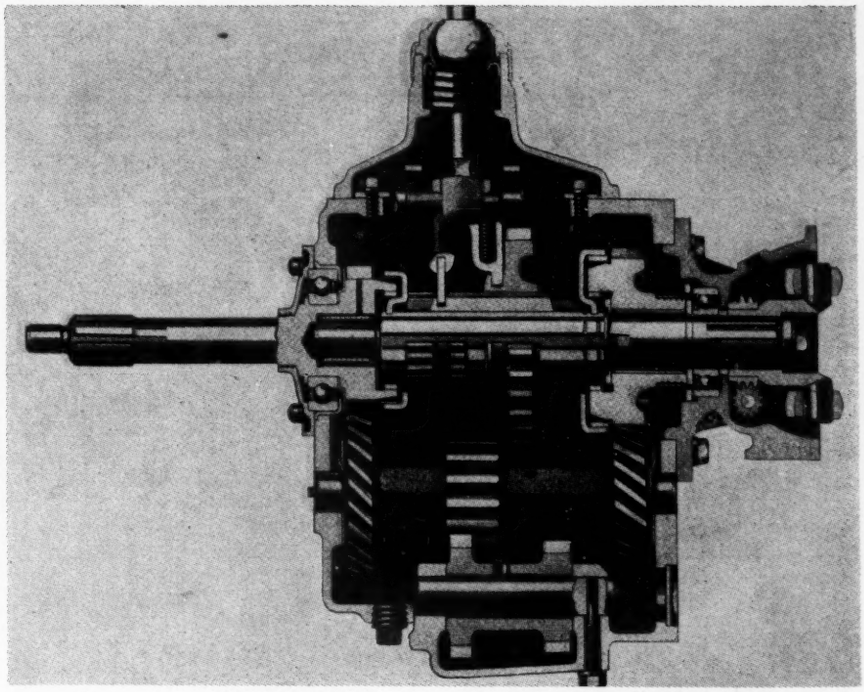
If I should find the solution, I will be glad to forward it to your firm to help others who have the same problem, as I am trying to satisfy my customer and his car. B. L. Bach, Aston Street Service Station, Aston St. and Lexington Ave., Asheville, N. C.

YOUR description of this trouble leads me to believe that the brake shoes are not centrally located within the drum. I would suggest that you loosen the anchor pin nut and with the anchor loose, expand the brake shoes by turning the notched adjusting wheel until a heavy drag is felt on the brake drum. Then, using a soft hammer, strike the anchor pin on the threaded end so that it will assume its correct position. Then, tighten the anchor pin nut securely to hold the anchor in that position. Then, back off the adjusting wheel until the drums are free of any brake drag. Loosen the eccentric lock nut and turn the eccentric in the direction of forward wheel rotation until a .010 inch feeler gage is snug at the anchor and adjusting end of the secondary shoe and then tighten the eccentric lock nut.

After this operation has been completed, again expand the brake shoes by turning the notched adjusting wheel until a heavy brake drag is felt and then, back off the adjusting wheel until the brake drum is free of drag. The point to remember when backing off the notched adjusting wheel is to be sure that you back it off the same number of notches on each wheel in order to insure an equal adjustment of each brake.



Aside from the actual brake adjustment, there are other conditions that might be the cause of your trouble. In the first place, be sure to check the brake backing plates to be sure that they are tight where they are attached to the spindle or the axle housing. Also examine the contact surface of the brake drum for machining marks. I have seen cases in which brake drums were machined too rapidly with the result that the cutting tool left marks inside the drum that resembled screw threads. When the brakes were applied these threads in the drum would cut a thread in the brake shoe lining and have a tendency to carry the shoe out away from the backing plate to the limit of its travel and then the shoe would snap back against the plate causing a noise. This would be repeated seven or eight times during a normal brake application. This condition can be corrected by sanding the inside of the brake drum to remove the thread.



Chevrolet Transmission

Spring Clips Stop Rumble In Rear

We have a 1935 Plymouth that has a rumble in the rear and which we feel is caused by the rear springs.

According to the information we are able to gather this trouble can be corrected by installing spring covers, installing new spring clips or by inserting pieces of canvas between the main leaves of the springs. Which, in your opinion, is the best method to use? A New York Subscriber.

IF the noise has been correctly diagnosed as spring leaf noise, the most satisfactory method I have found of correcting it is to install special spring clips. These clips can be made of ⅛-in. band iron formed in the shape of the letter "U," and held together at the top by a bolt.

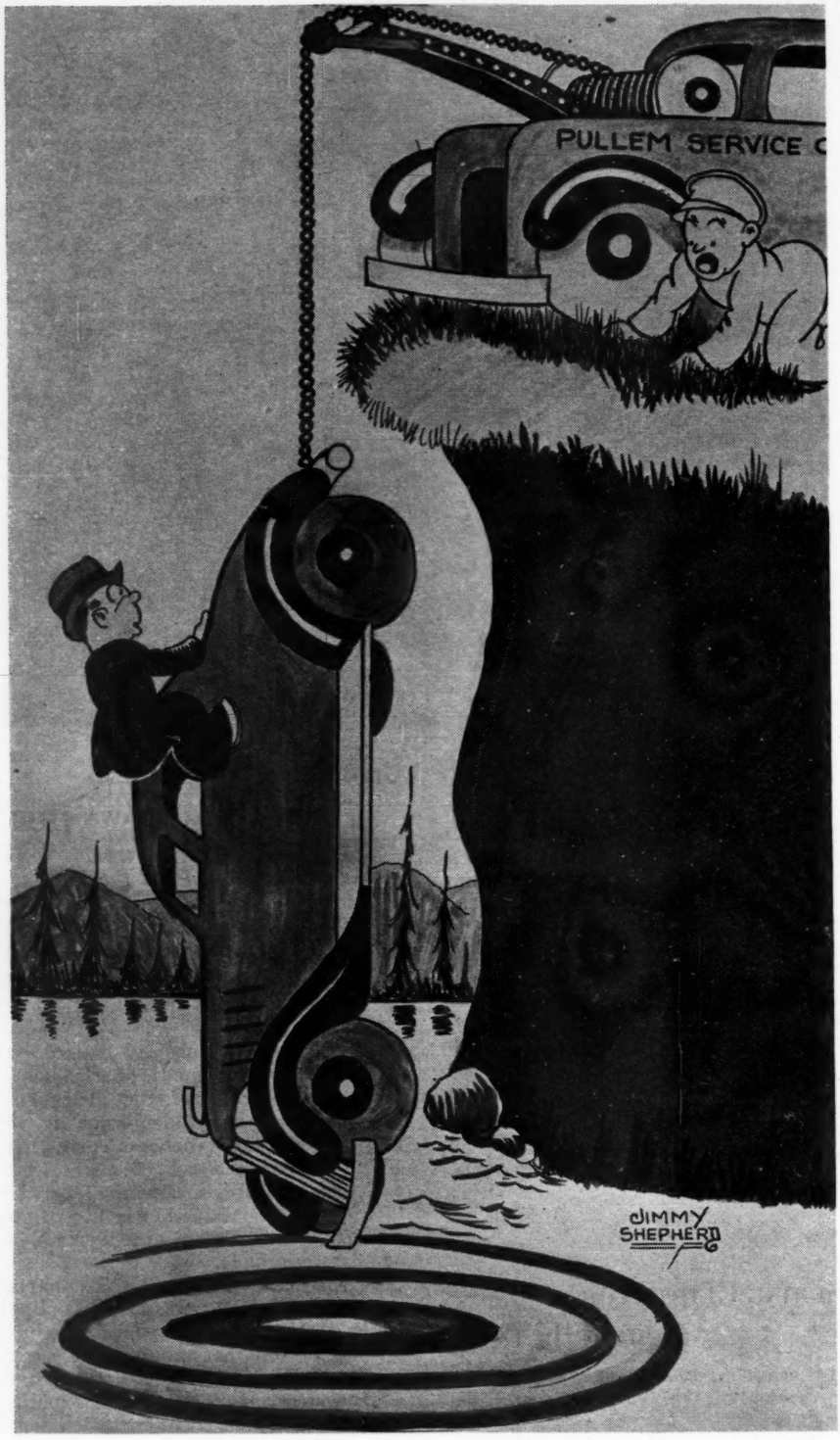
Jumps Out of Second Going Down Hill

I am having a lot of trouble with 1936 Chevrolet, Ford and Buick transmissions coming out of second gear going down hill when using engine as brake. I would like to know if you have any suggestions for the correction of same. George W. Morton, C. G. Morton Co., Jackson, N. H.

THIS trouble is usually caused by an excessive amount of clearance between the teeth of the gears engaged when the transmission is in this position, and the best correction is to hand-pick a set of gears that will give a minimum amount of backlash. I realize that this is not often possible due to the limited selection of gears available.

In the case of Chevrolet, the parts to replace are the transmission spline shaft, the high and intermediate sliding sleeve and the second speed gear. If you will order these parts from your source of supply and explain that they are needed to correct a condition of jumping out of second gear, I believe an effort will be made to select gears that have a closer fit. The only information I have been able to get that would apply to the Ford and the Buick is to stiffen the transmission shifter rail interlocking spring either by installing a heavier spring or stretching the spring that is already there. It might also help to file the notch in the shifter rail deeper so that the interlocking ball or plunger forms a more positive lock.

It would be well to check the amount of end play in the cluster gear, and install new thrust washers if the end play is excessive.



"Take it easy, Mr. Jones, Mac had to walk to town for some gas . . . we ran out."

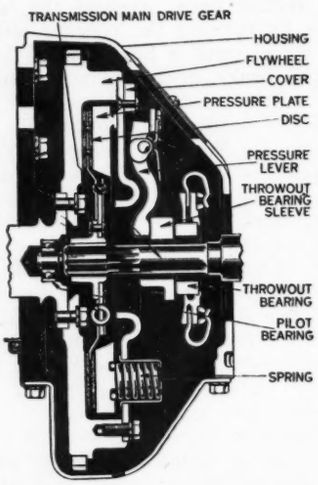
Correction for Clutch Grabbing

I am writing you with regard to some trouble I am having with a 1934 model 603 Pontiac clutch. The trouble I am having with it is the clutch grabbing. You can't let the pedal out without the car jerking you.

Here is what I have done to it. Put new clutch facing in, tested pressure plate, checked disk, also splines. All were O K. But this did not help. The motor hangers are rubber and seem to give too much when you let the clutch out, so I made two straps, one for each side of the transmission. This did more good than anything but the owner of the car thinks the motor should not be strapped down and said the clutch is grabbing about the same.

If you can help me any on this one please let me know as soon as possible, and did they change the clutch on this model Pontiac? Malcolm E. Hardin, Little Shop on Main, 412 South Main Street, Hopkinsville, Ky.

I DO not favor the addition of the two straps you mention as I feel that this will have a tendency to transmit too much engine torque to the frame of the car and create an objectionable condition in so far as the driver is concerned. I believe the engine can be made standard in so far as absorbing torsional vibration is concerned, by properly adjusting the engine mountings, or, if necessary, replacing them with new ones. The engine mountings are designed to permit a certain amount of flexibility to the engine and you are destroying this by the addition of these straps.



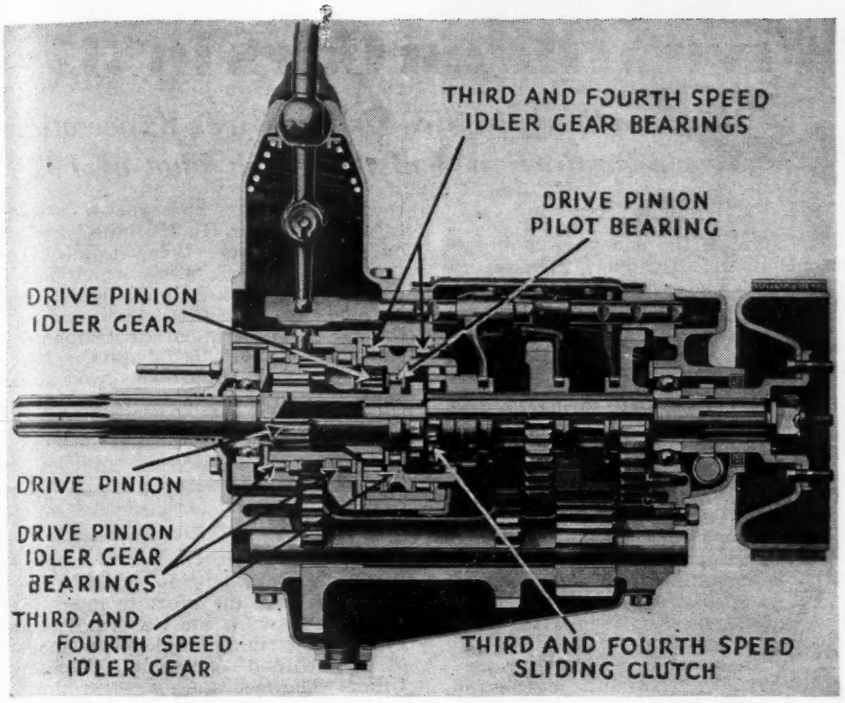
Your letter does not mention that you have adjusted the height of the clutch pressure levers and, if you have not, I would suggest that you check them to be sure that they are all the same distance from the front face of the pressure plate. These levers should be checked with a special gage but if you do not have it, they can be checked by carefully measuring the distance from the front face of the pressure plate to the release bearing contact surface of the pressure lever. This distance must not vary greater than .005 in. from one lever to the other.

If, after testing the levers, you do not get relief, I would suggest that you install a new clutch driven disk which you can secure from your nearest Pontiac dealer under part No. 491196. I understand that this is a new plate having special lining and I feel sure it will be of assistance to you in correcting this condition.

Grease Leak at Front Of Transmission

Recently we overhauled a Chrysler 1932 CP coupe transmission and refilled it with grease which worked out of the front end of the case.

I replaced the gasket between the clutch assembly case and transmission case hoping to thus remedy the trouble but it still leaks dry after 500 miles.


THIRD AND FOURTH SPEED IDLER GEAR BEARINGS
DRIVE PINION PILOT BEARING
DRIVE PINION IDLER GEAR
DRIVE PINION
DRIVE PINION IDLER GEAR BEARINGS
THIRD AND FOURTH SPEED IDLER GEAR
THIRD AND FOURTH SPEED SLIDING CLUTCH

Any information you can give me will be greatly appreciated. Ernest Prehn, Hunterdon Garage Co., 722 Hunterdon St., Newark, N. J.

UNLESS this transmission case is cracked, it is quite apparent that this grease is coming out around the clutch gear and shaft assembly and I am wondering if you have checked the gasket between the case and the clutch gear bearing retainer. It seems to me that this is the best point for this leak to occur and if you have not already done so, I suggest that you remove the clutch gear bearing retainer and install a new gasket at this point.

It would also be well to drill a ⅛-in. hole in the top of the transmission cover to relieve any pressure that may be building up in the case.

Transmission Sticks In Low Gear

I am the owner of a Model 1061, 1932 Nash and have been having trouble with the gear shift lever locking in first speed. That is, the engine is geared to first speed even though I have apparently moved the gear shift lever out of first speed and it has slipped into neutral. However, when this happens, I can no longer move the lever to any other position.

It has occurred to me that possibly the lever leaves the slot cut in the port on the left side of the transmission case and does not slip into the corresponding slot on the other side, getting either before or after the point where it should be in order to push the second gear into place.

Will you please tell me how I can adjust this, and if you have a picture of a Nash transmission please send it to me, pointing out what must be done? V. C. Schwoyer, 3139 87th St., Jackson Heights, New York, N. Y.

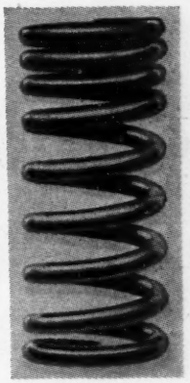
THE difficulty you mention with the transmission of the 1932 Nash car seems to indicate that the low and reverse gear shifting fork is not securely fastened to the shifter rail. This would account for the fact that the fork will not move the low gear out of engagement with the cluster gear. If the fork was broken it seems to me that the condition would have been apparent at the time the break occurred, as it is usual for the broken part to drop down in the case and damage the gear. Since this has not happened, it seems safe to assume that something is out of place.

The thing to do is to remove the transmission cover and inspect the shifter rail and fork and make such repairs as may be necessary. If the fork is loose on the rail, it may be possible to simply fasten it in place and the condition will be corrected. However, if the looseness is due to wear, it would be advisable to replace the parts with new ones.

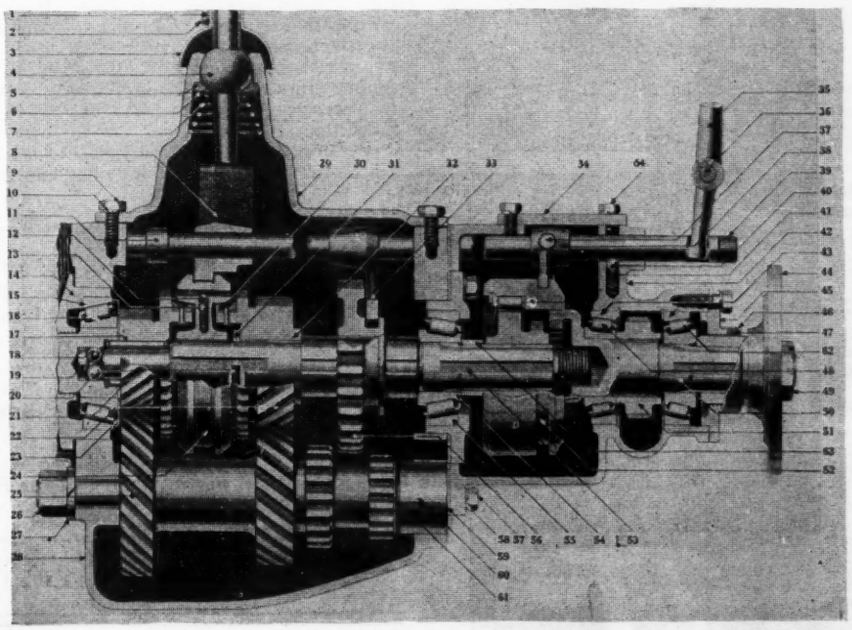
Correction for Valve Spring Breakage

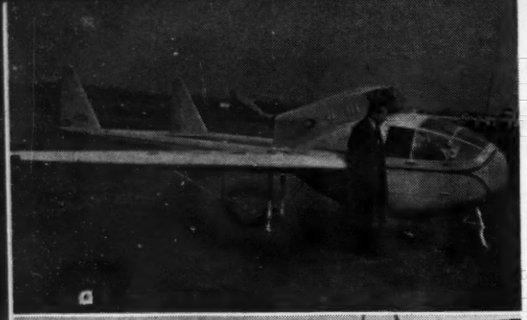
I have a 1933 Oldsmobile six that keeps coming in with broken valve springs. The last time we put in a whole new set and checked all the valves and it keeps breaking springs just the same. I wonder if you could help me. C. LaPointe, LaPointe's Garage, Newmarket, N. H.

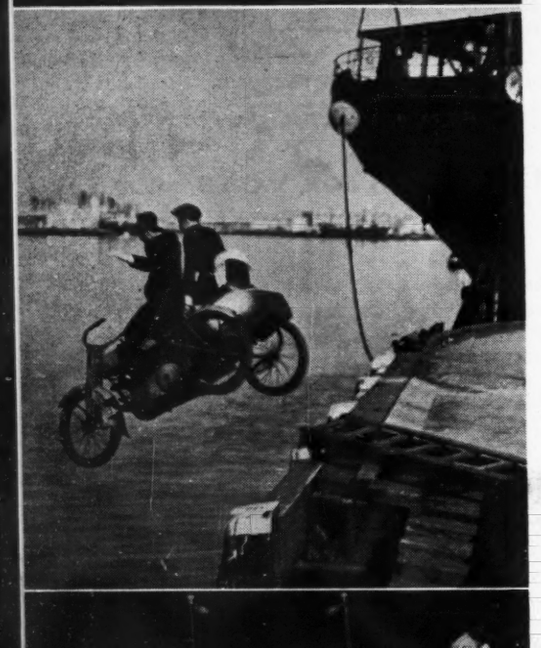
I BELIEVE you can eliminate this trouble by installing the type of valve springs used on the 1935 and 1936 model Oldsmobile. This valve spring has three closely wound coils at the upper end which are designed to prevent surging.

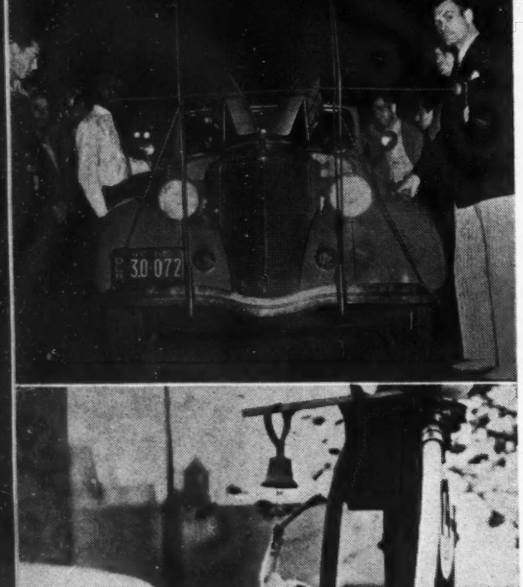


With this type of spring, the valve spring cage that was used on the 1933 model is not necessary. Install the new springs with the close coils at the top and I believe your troubles will be over. My suggestion is that you install a complete set of this new type of spring without the cage.









"Five Million Cars in '37"

Huge Bank of Unfilled Orders Gives Expectation Year's Production Will Approach That of 1929

By Harold E. Gronseth

The start of the new year finds the automobile industry operating full tilt with its leaders confidently looking forward to a 5,000,000-unit output in 1937. That appears to be the minimum expectation for the post-depression peak that is due to be reached this year and will compare with the all-time record that was set in 1929 when 5,621,715 cars and trucks were produced.

The industry carried over into the new year the largest volume of unfilled orders ever held at this time, estimated in excess of 250,000. Despite the heavy production in recent weeks, some of the leading companies still had enough advance business booked to keep their plants busy from three to six weeks. Even with uninterrupted operations, little will be accomplished toward stocking dealers until February. Normally dealer inventories should be at a maximum about March 1, since after that date retail sales through the spring months absorb about all the vehicles the plants can turn out.

Barring shortages in parts or materials, motor vehicle production will be held just about at top level throughout the first half of 1937. In order to attain the goal of 5,000,000 units for the year, production must average better than 416,000 units a month and 1,250,000 units a quarter. Only the second quarter of 1936 exceeded that total.

Approximately 56.5 per cent of the 1936 motor vehicle production was accounted for in the first six months of the year. The same ratio applied to the anticipated 5,000,000 units this year would mean an output of 2,825,000 units in the first half of 1937. The first quarter of 1936 accounted for roughly 24 per cent and the second quarter 32 per cent of the year's total. If the same ratios hold in 1937 and the 5,000,000-unit goal is attained, then we may look for upward of 1,200,000 units in the first quarter and 1,600,000 in the second quarter. In other words, the first three months of 1937 should average better than 400,000 vehicles a month and the second quarter will have to average more than 500,000 vehicles monthly.

Preliminary estimates indicate that December output ran somewhat better than 480,000 cars and trucks, or well in excess of the 418,317 units turned out in December, 1935, despite the troubled labor situation which hampered operations. Final figures on November production, published by the U. S. Department of Commerce, showed a total of 405,702 units, or 2848 units under the figure for November, 1935. This brought the 11 months' total to 4,097,725 units and indicates a total output for 1936 of 4,577,000 cars and trucks.

G.M. Strike

Mediators from the U. S. Department of Labor went into action in Detroit Jan. 5 in an effort to break the deadlock between the General Motors Corp. and striking employes, members of the United Automobile Workers Union. The mediators were in almost continuous conference with GM and union officials but without result at the time MOTOR AGE went to press.

Trouble began at the Fisher Body plant in Cleveland, where workers staged a sitdown strike the last week in December, and rapidly spread to other GM units. Shortage of bodies and parts forced assembly lines to close which in turn backed up on outside parts makers and suppliers of raw materials obliging them to curtail or even shutdown operations.

It was estimated that at least 90,000 workers in the automotive and allied industries, of which approximately 55,000 were GM employes, had been thrown out of work. Officials of the corporation estimated that at least 135,000 men would be idle if the strike was not settled before Jan. 10.

Most important of the original UAW demands was that the union be recognized by General Motors Corp. as the sole bargaining agency for all of its plants. Alfred P. Sloan, Jr., GM president, replied that the corporation "will not recognize any union as the sole bargaining agency for its workers, to the exclusion of all others." No compromise on this issue is possible, according to officers of the company, who refused to enter into any negotiations with the union until the strikers had evacuated the plants in which sitdowns were being staged.

Down the Column:

The Flying Egg, a new low cost safety airplane being inspected by Government officials. The ship is an all metal three wheeled job, powered by a converted, geared down automobile engine.

●

Going off the deep end into the Pacific was a motorcycle stunt performed in making the forthcoming movie "Dick Tracy."

●

Controlled by radio wave, this car can roll along without a driver, shift gears, sound horn and perform most of the functions of the "nut that holds the wheel."

●

A cat, owned by a service station operator in Canterbury, England, is trained to leap up and ring the bell whenever a customer drives up for gas. At least, that's the Canterbury tale.

Los Angeles Opening Date Is Postponed

Plans for opening the proposed Los Angeles (Calif.) Raceway on March 28 have been abandoned and the date when this road racing course will be ready for the major automobile racing circuit is not yet known, according to a recent announcement from national headquarters of the Contest Board of the American Automobile Association, governing body of the sport, in Washington, D. C.

The Pacific Coast racing plant, a counterpart of the new Roosevelt Raceway at Westbury, Long Island, N. Y., was originally scheduled for a late fall opening in 1936 and when the Long Island track's George Vanderbilt Cup classic on Oct. 12 crowded the schedule, the event on the west coast was shoved back to March 28 of this year.

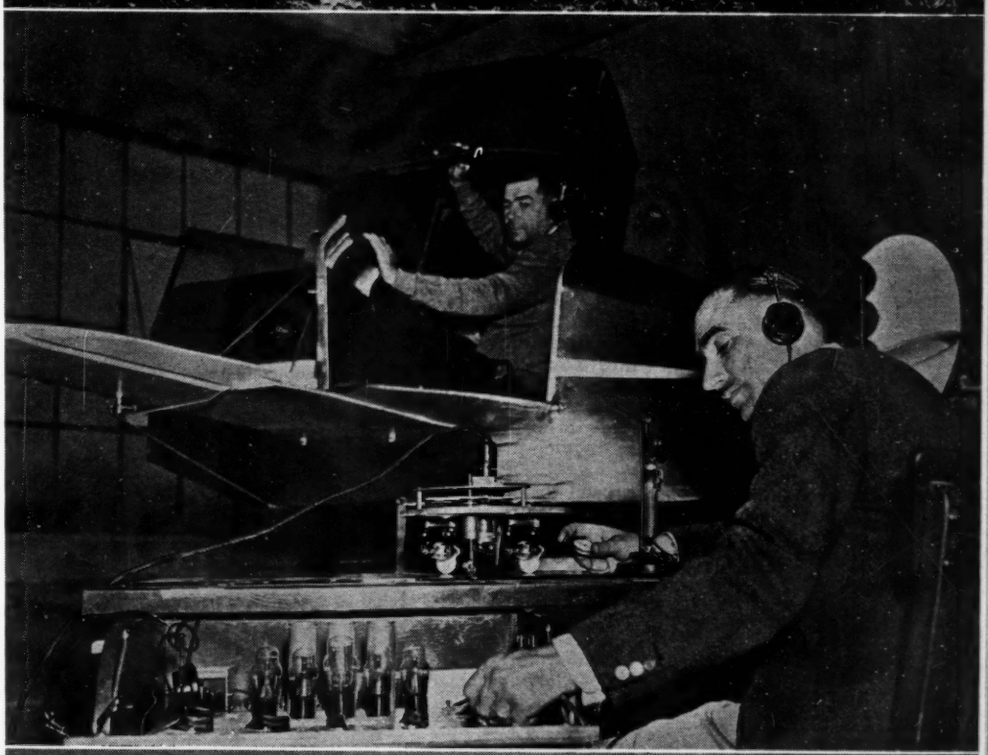
Cancellation of the new date was blamed on the unsettled labor conditions in California and the resultant high cost in building material.

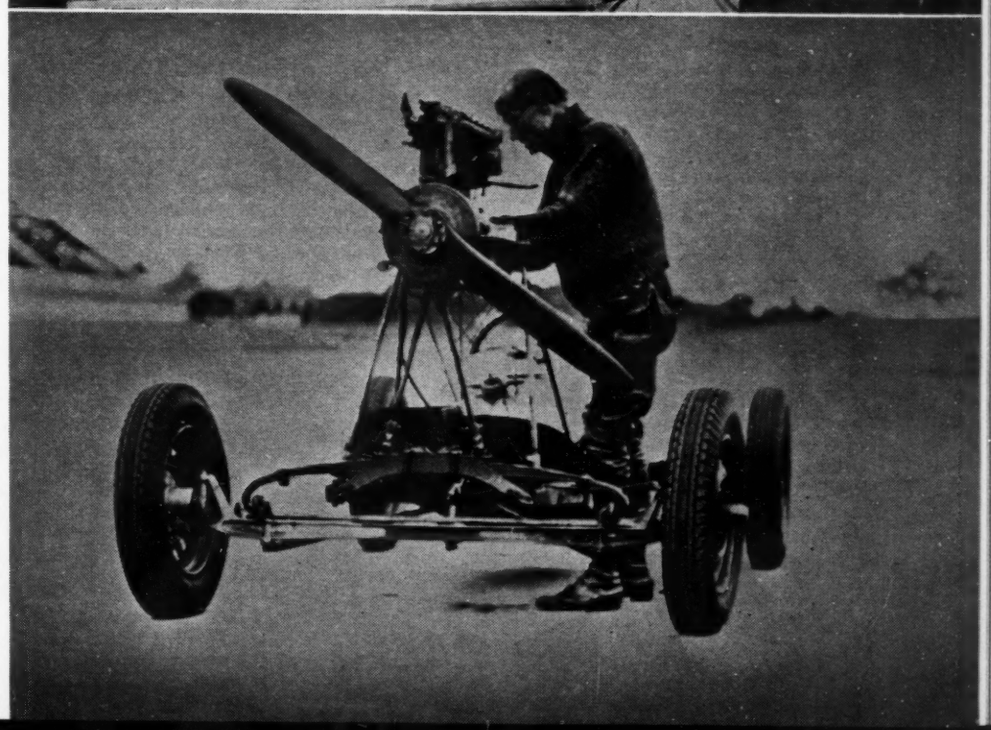
Official notification of change in the opening date was made by Captain Eddie Rickenbacker, Chairman of the A.A.A. Contest Board, who, in a statement to the Press, said:

"Every effort has been made to combat the difficulties confronting the Raceway officials as a result of the labor crisis in Southern California. Even at this date it would be possible to rush the Los Angeles Raceway to completion in time for a March 28 opening. However, the Contest Board, in the best interests of the racing fraternity and the public, holds that assurance by Jan. 1 of the track's early completion would be necessary, and with the Los Angeles management unable to meet this deadline, the Contest Board has decided to schedule the opening at a date to be determined later."

Although Captain Rickenbacker was definite in his statement that an early opening of the Los Angeles Raceway was not possible, he was

(*Continued on page 67*)





Down the Column:

Fire-Mobile used at the French Airdrome at Bourgois, Paris, has this contraption on the front of the engine to shoot carbon monoxide at the blaze and thus extinguish the fire.

●

Device for testing pilots in blind flying. Pilot is locked in a windowless compartment equipped with controls, rate-of-climb instruments and other indicators. He wears earphones for receiving communications. The equipment duplicates every phase of blind flying and traces in red ink on a scale map the course flown by the student.

●

Air-Mobile, propelled by a 22 hp., one cylinder engine, is said to be capable of doing 40 m.p.h. M. Doue, a Frenchman, is the inventor.

The "Marsh Buggy," best described as a cross between an automobile, a tractor and a boat—is a special development of the research laboratories of the Gulf Oil Corp.

Big Attendance Marks Successful ASI Show

With attendance marks for other years shattered, Chicago became the Mecca of the automotive after-market when the NSPA, MEWA and MEMA held their annual meetings, and combined to stage the ASI show at Navy pier last month.

The NSPA elected Leo F. Hunderup, assistant general manager of the Van Norman Machine Tool Co., of Springfield, Mass., as its president. V. C. Hossellman of the Siferd-Hossellman Company of Lima, Ohio, was elected senior vice-president; and L. G. Matthews, general sales manager for Sealed Power Corp. of Muskegon, Mich., was elected junior vice-president.

Two new manufacturer directors were elected to fill the places of those whose terms had expired. They were: J. Harvey Williams, president of J. H. Williams and Co. of New York City; and T. Lattimer Ford, sales manager of American Hammered Piston Ring division of Koppers Co. of Baltimore, Md. C. C. Bradford, president of the Eaton Products Co., Inc., of Cleveland, was elected to fill the vacancy created by the resignation of Frank C. Kip, president of Automotive Thrust Bearing Corp. of Chicago.

New directors elected to represent the wholesalers division were: H. F. Wible, vice-president, Air-Land Motor Parts Co., Greensburg, Pa.; R. B. McLure, vice-president, Parts Service Corp., Montgomery, Ala.; and David Ruskin, president, Sanders and Ruskin, Inc., of New York City.

The show at Navy pier held two and a half miles of exhibits, with 355 exhibitors occupying 928 booths.

Ohio State to Open Diesel School Feb. 1

A school for operators and maintenance men working on Diesel engines will be held in February at Ohio State University, it has been announced by Prof. Karl W. Stinson, department of mechanical engineering. The school, starting about Feb. 1, will last three weeks, and enrollment will be limited to a class of 50 men.

Donald Blanchard

Don Blanchard Joins SAE Headquarters' Staff

Donald Blanchard, formerly editor of *Automobile Trade Journal*, has joined the Society of Automotive Engineers headquarters' staff, John A. C. Warner, Secretary and General Manager of the Society announced today. Mr. Blanchard will be secretary of the SAE Engineering Relations Committee.

Charged with supervision of all contacts between the SAE and outside agencies, this committee supplies engineering facts to automotive engineers and technicians of administrative and regulatory agencies so as to remove technical safety matters from the argumentative class.

In the 17 years since he first joined the Chilton Co., Mr. Blanchard has not only been editor of the *Automotive Trade Journal*, but also *Commercial Car Journal* and *Automotive Industries*.

Gulf "Marsh Buggy" Pulls Through Swamplands

Strangest vehicle circulating in the U. S. is probably the "Marsh Buggy" used by the Gulf Oil Corp. to transport crews and equipment into the swamps of Louisiana. This ingenious automobile-tractor-boat hybrid is equally at home on land, in waist-deep mud or in water deep enough to float a liner. It weighs 7500 lb., has an overall length of 22½ ft. and is powered by a Ford V-8 engine with an oversize cooling system. At the rear, a passenger car transmission is coupled in series with a McCormick-Deering tractor gear box, the combination giving 10 forward and 6 reverse speeds.

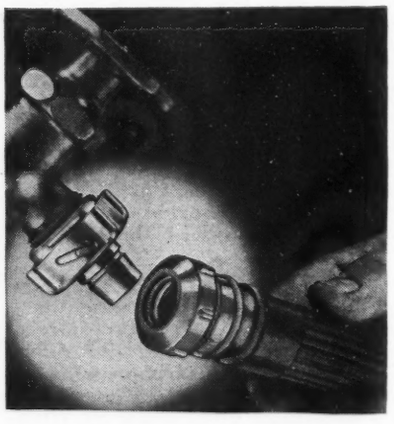
The front wheels receive their power from chains passing over sprockets on the back axles. This gives a differential action between the wheels on either side but not between front and rear wheels. The transmission has two brakes, each controlling the wheels on either side, so that the machine can be steered when afloat by braking the wheels on one side.

The tires of the marsh buggy were designed and fabricated by the Goodyear Tire and Rubber Co. and are said to be the largest ever molded. They are 10 ft. high, approximately 3 ft. wide and are mounted on 66-in. rims. Their displacement is so great that the vehicle floats with an immersion of less than 2 ft. In case of puncture of one tire a constant pressure can be maintained by a compressor which feeds air into the tube. In water or marshes, traction is obtained by attaching to each wheel 12 treads made from 2-in. inflated rubber hose.

Aluminum was used to a great extent in the marsh buggy in order to assure lightness. The wheels, sides of the chassis, and platform are of this metal.

Besides an automobile license, the vehicle also carries a marine license and has fulfilled the requirements for Class 1 power boats.

Speed of the marsh buggy is 35 m.p.h. over smooth ground, from 10 to 12 m.p.h. in swamps, and in water it makes a little more than 6 knots.



Snap-On Hose Coupling

The Eclipse Machine Co., Elmira, N. Y., has introduced a new "Red Cap" hose coupling which snaps on and off the faucet. It is leak proof and swivels so that kinks are eliminated, and fits any standard threaded faucet. Price 60c.

Eyston Reported Planning Attack on Campbell's Speed Mark at Bonneville

Claims of English motor racing experts that Captain George Eyston, fellow countryman of Sir Malcolm Campbell, would be the next aspirant for the world land speed record have been substantiated in the United States by officials in charge of the famous Bonnevillle Saltbed in Utah where the purported assault is planned for 1937.

Releasing the information that he had received a formal application from Captain Eyston for use of the famous Saltbed for trials with a world straightaway record car, Gus P. Backman, secretary of the Bonneville Speedway Association said the speed site would be turned over to the English daredevil in mid-June. The Bonneville Speedway Association is a Salt Lake City group in whose management has been placed the salt flats since record activity has been moved there from the once popular ocean strand at Daytona Beach, Florida.

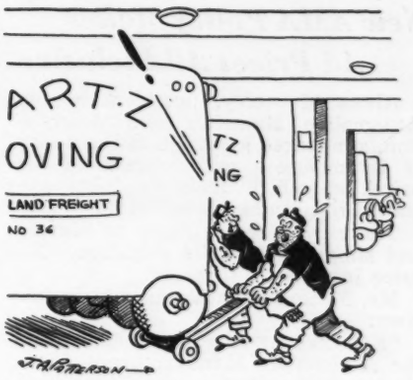
Although Backman quotes Eyston as saying that his mid-June trial with his new record car will be confined to "tests" rather than a serious attempt at Campbell's record of 301.1292 miles per hour, English racing experts have for some time held Eyston as a serious threat to Campbell's present title as world speed king. They say Eyston will bring his newly designed record car to the United States in an effort to set a new all-time record for the flying mile.

Beckman has quoted Eyston as saying, when he made application for use of the Saltbed: "Sir Malcolm Campbell has retired from the land speed record arena, and I have been asked to gain some experience of those high speeds. My car would be experimental, and since the target is now so high, I must be content to make some tests before anything serious is attempted."

Campbell, who has held the land speed record unchallenged since 1929 and who annually, except for 1934, raised his own record, definitely announced his retirement last summer. It was during an international radio broadcast that he invited Ab Jenkins, America's No. 1 speed record holder, to seek the mile record "which I must not again attempt to raise because of promises to my family." Campbell said he had promised Lady Campbell that once he attained a record of 300 miles per hour he would quit the thrill of further speed activity. He surpassed the gait September, 1935, when he roared over a measured mile at Bonneville in his giant "Bluebird" racer for the now existing mark of 301.1292 miles per hour.

Captain Eyston looms as the most

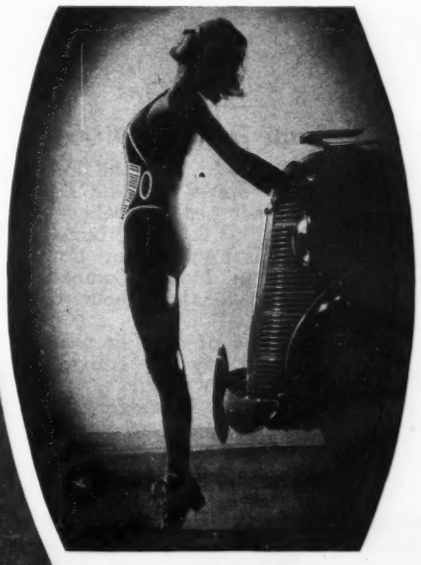
(*Continued on page 66*)



"So I sez to her—I'm sick of pushing you around a dance floor every night!"

Liquid Weld for Cracked Blocks

Sure-Weld, a product of Sure-Rite Products Co., Andrews & Cedar Park Aves., Philadelphia, Pa., is a new metallic liquid with other ingredients scientifically compounded to repair cracks in valve ports, inside cylinders and in water jackets. One pint is required for passenger cars, and one quart for trucks. It is poured into the cylinder block by removing the upper radiator hose after draining the cooling system to half capacity. The engine is allowed to run until it is hot before the solution is added, and then is run at idling speed for 15 minutes. Additional water is then added slowly until normal capacity is reached. Sure-Weld is said to have a cleaning effect on the cooling system.



A pretty girl to match this Pontiac car . . . not standard equipment, you see, but just a publicity man's idea of a good picture

(Lower left) Giving a car radio "the works." Here is a service expert operating the new Bendix-Dayrad car radio inspection device.

(Below) Odom Tire and Battery Co., Exide dealers, created a lot of attention in the Spartanburg (S. C.) Santa Claus Parade with this dog and 'possum float.

New AMA Policy Makes Ad Prices All-Inclusive

Alvan Macauley, president of the Automobile Manufacturers Association, announced a change in the policy of its members with respect to the prices at which their products are quoted in national advertising.

The new move is made to clarify and simplify the price situation. No price increase is involved.

Mr. Macauley's statement is as follows:

"Effective at once, the members of the Automobile Manufacturers Association will adopt a more simplified method of pricing motor cars. However, the intent of this action is not to change the price the customer will pay, and, except for some very slight modifications incidental to the details of its application, the price the customer pays will remain the same as before.

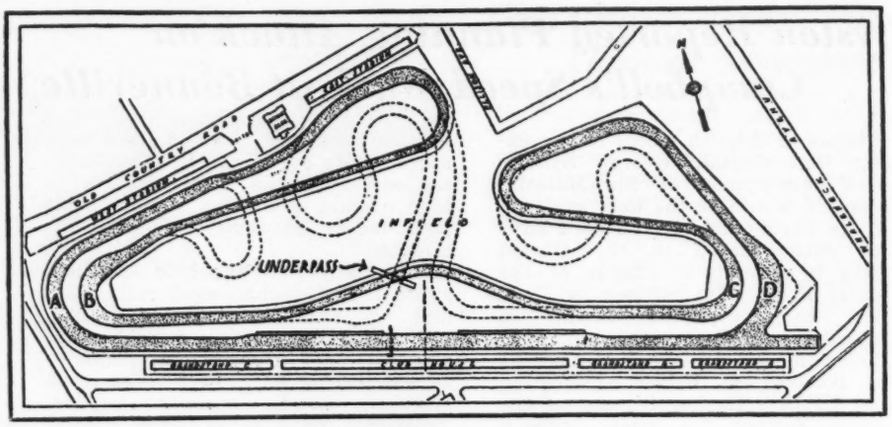
"In the past, a list price, f.o.b. factory, has been used in advertising. That list price did not include such things as a charge for preparing the car for delivery, reimbursement of Federal tax, nor such accessories and extra equipment as the purchaser might have elected to buy.

"Effective at once, the new simplified price will be a 'delivered price' at point of manufacture, which will include the charge for delivery, reimbursement of Federal tax, and all essential accessories, such as the spare tire, and bumpers, which are now universally needed by all purchasers and have come to be known as standard equipment. To determine the retail price at any particular point of delivery, it will only be necessary under the new method for the purchaser to add the following charges to the advertised delivered price at the factory city:

"1. Transportation from point of manufacture to point of delivery;

"2. State and local taxes—if any—at point of delivery.

"Should the purchaser elect to buy a more comprehensive group of accessories, these will be available at prices to be quoted by the dealer.



Roosevelt Raceway Revised

The shaded course outlines revisions made in the Roosevelt Raceway at Westbury, L. I. The dotted lines show the old track. The corners A, B, C, and D are to be given a moderate flat highway bank to permit entering and leaving the two long stretches at higher speed. Where the inside and outside back stretches have been joined bends have been added. The track is now three and one-third miles long

"This pricing policy will go into effect immediately in newspaper advertising and, as soon as it can be accomplished, in national advertising.

"As stated above, this change is one of method only and, although it will cause practically no change in the retail price of the car to the purchaser, the new advertising will make it possible for the prospective buyer to determine more closely the total price of any particular car."

Ford to Quote Delivered Prices

A factory dispatch from the Ford Motor Company states that on Dec. 3 the company adopted the policy of eliminating all "F.O.B." and "factory list" prices from Ford Motor Company and Lincoln Motor Company advertising effective throughout the United States.

The new method of quoting prices will not change in any way delivered prices to the dealer or public.

Any prices stated in factory advertising will be the delivered prices at Dearborn, Michigan, without taxes.

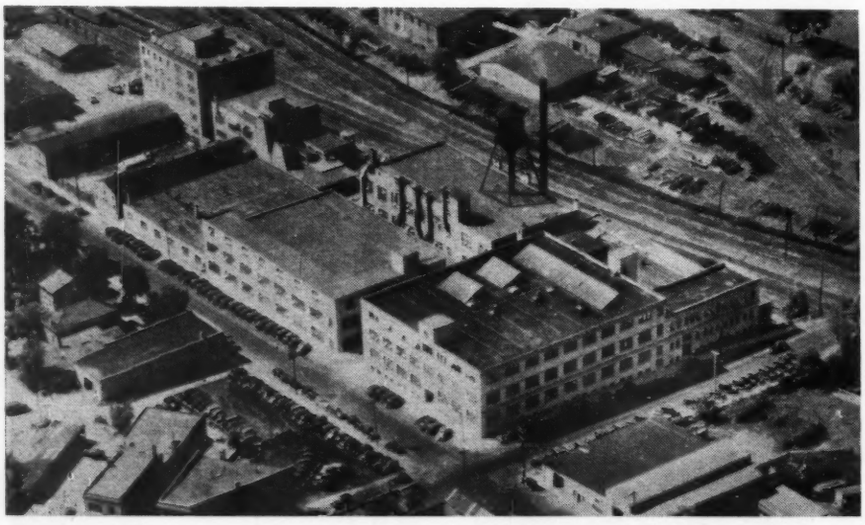
Minnesota Mining & Mfg. Co. Shares Profits With Employes

Employes of the Minnesota Mining and Manufacturing Co. of Saint Paul, Minn., one of the world's largest manufacturers of surface coated abrasives and patented pressure sensitive adhesive tapes, are now sharing directly in the profits of the organization, it was announced by W. L. McKnight, president. More than eighty thousand dollars was distributed to approximately 1400 office and factory employes Dec. 12 as their participation in the 1936 profits. Workers with 30 or more months of service received approximately 6½ per cent of their net base pay for the past year. Those with shorter lengths of service received smaller percentages on a graduated scale.

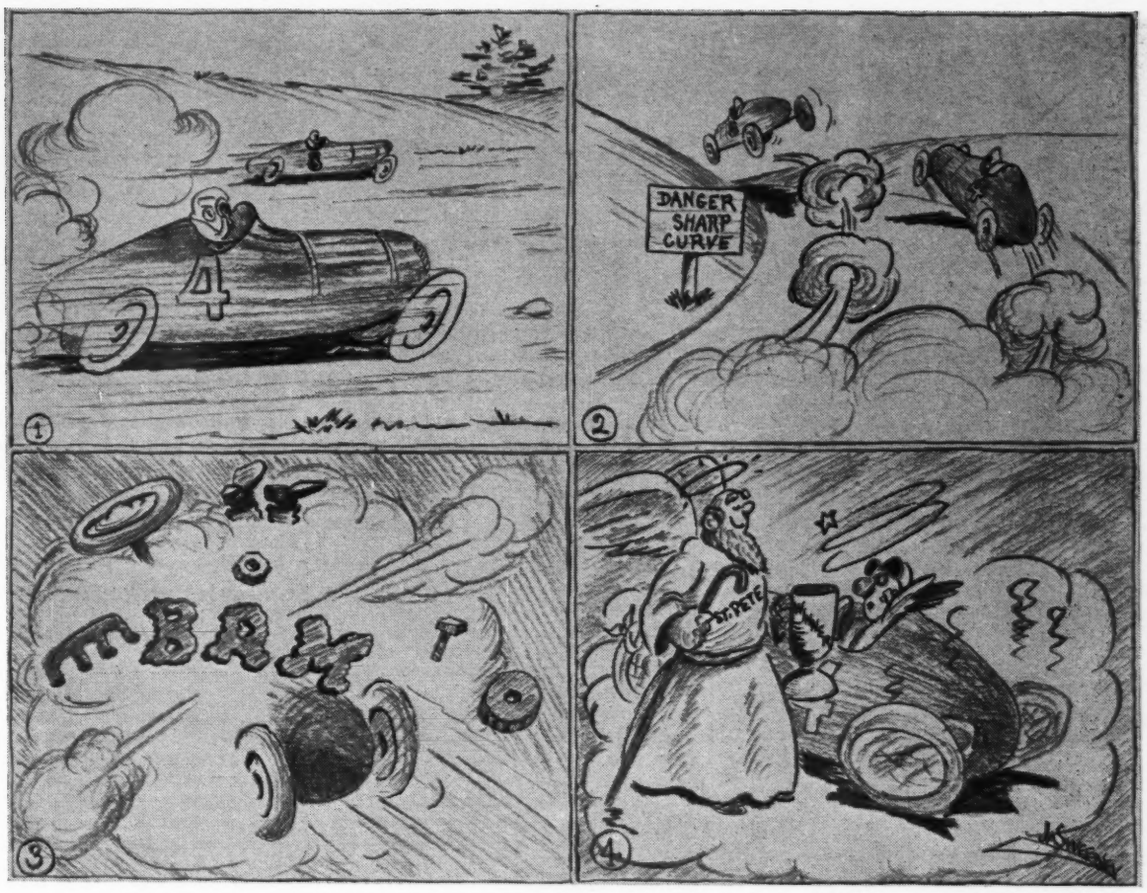
Under the new profit sharing plan, Mr. McKnight stated, payments will be distributed quarterly beginning with 1937. The amount of any distribution will depend entirely upon the profit record of the company. A reserve fund will be set aside from profits every quarter, calculated on the net worth of the company at the time. This fund provides for dividends and reinvestment of earnings in the company. Ten per cent of the profits remaining after the reserve fund has been set aside will go into the profit sharing fund for distribution to the employes.

For a number of years past the company has permitted employes in the more responsible positions to participate in profits. Under the new plan this privilege will be extended to the entire personnel. Employes participating in any other type of profit sharing or commission plan will not be included in the new distribution.

More than six years ago a pension plan was established for its workers. In 1932 it set up an unemployment benefit plan supported from company earnings which was among the first to be established by any private corporation in the United States. The present profit sharing program is unusual and among the first of its type to be adopted by any company.



The plant of the Minnesota Mining & Mfg. Co. which shares profits with its workers, according to W. L. McKnight, president of the firm

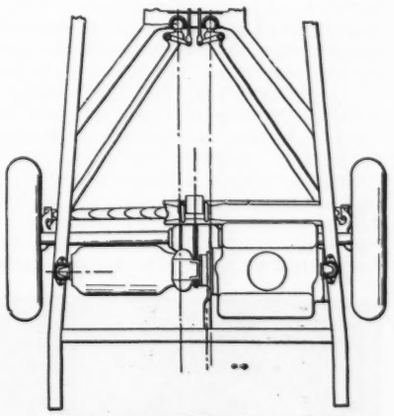


Ford Gets Patents on Rear-Engined Car

Another patent on a rear-engined automobile has been issued to Henry Ford (U. S. Patent No. 2,065,065, automobile chassis construction, Dec. 22). In the new design, on which an application was filed May 10, 1935, the drive is through the rear wheels and the powerplant is mounted crosswise directly back of the axle. The differential and drive-gear housing forms a unit with the powerplant, and the rear-axle halves are arranged so they can oscillate in the vertical plane. Radius rods extending forward and inward are formed integral with the axle tubes. These radius rods are supported by ball joints from a frame member at their forward end, in longitudinal alignment with spherical joints at the inner end of the axle tube. The entire powerplant, including the driving gear, is resiliently mounted on the chassis frame and through it is supported on the chassis spring. The mounting is said to be such that vibrating forces originating in the engine tend to cause the whole powerplant to oscillate around the drive-gear axis.

Rear suspension of the chassis is by a single transverse spring located ahead of the axle. Two frame cross members at the rear form a rectangular compartment into which the power unit is set. The engine shown in the drawings is the familiar Ford V-8; its crankshaft is splined to a drive shaft which extends through to the outer end of the transmission housing.

The granting of this patent is a routine procedure, according to Mr. Ford, and does not mean that the company is contemplating any immediate change in the design of its cars. "It is one of the many engineering developments of our research and we are merely protecting our invention," said Mr. Ford.



Plan view of Ford-patented rear-engined chassis

Get This Free Booklet

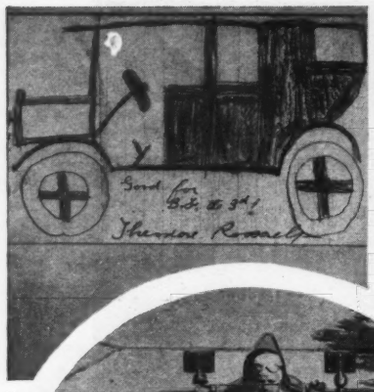
A new 24-page booklet describing correct methods of installing Coil Piston Rings in various makes of cars has just been issued by the National Coil Piston Ring Sales Corp., 3721 Washington Blvd., St. Louis, Mo. The book is the work of C. W. Isselhardt, Chief Engineer, and was written especially for the mechanic and motor reconditioning specialist. Write for your copy.

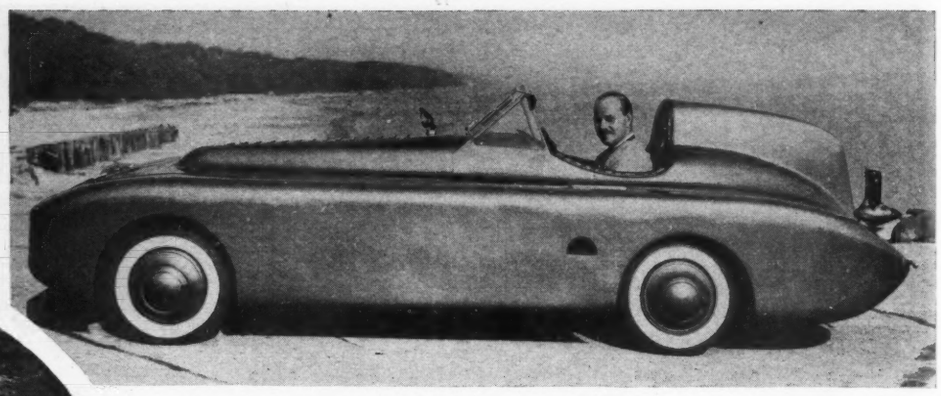
Bee-Line Developes New Chassis Aligner

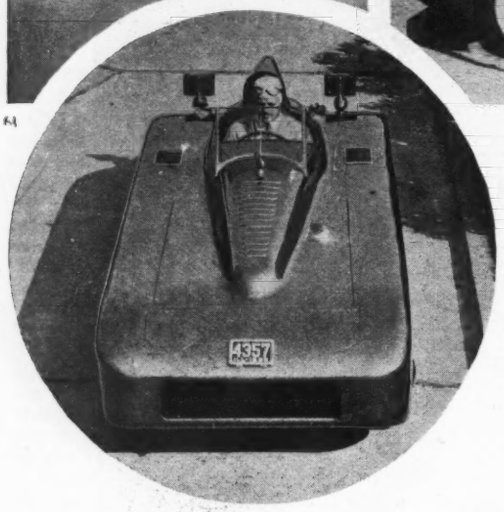
The Bee-Line Mfg. Co., P. O. Box 569, Davenport, Ia., has recently announced a new Master Model Chassis Aligner. Said to contain many exclusive features, the Bee-Line chassis aligner will permit straightening the chassis without removing the body, and checking and correcting front end alignment without disassembly. One feature of this equipment is the removable runway on either side, which permits easy access to the under side of the car.

Device Operates Parking Lights Automatically

Among the relatively few novelties exhibited at the recent Paris automobile show was a device which lights the parking lamps of a car automatically when darkness sets in and extinguishes them automatically when it becomes light again. The device is known as the Photorelay Chilowski (Chilowski-Tubest System) and is being manufactured by Société Tubest, 6 rue Euler, Paris. It is no larger than a Swedish match box and is mounted on the instrument board.



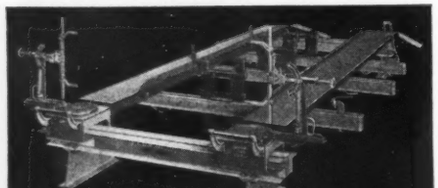




B. F. HARRIS of Chicago and his hobby—a streamlined front-drive car built in his spare time. In the right hand corner is "his first attempt" drawn at the age of five and inscribed "Good for B. F. the third—Theodore Roosevelt"

Bear Has New Frame Straightening Machine

A new combination frame straightening and wheel aligning machine has been announced by the Bear Mfg. Co., 21st and Fifth Ave., Rock Island, Ill. The frame straightening mechanism is hydraulically powered, and makes



it possible to straighten the frame without removing the body. A combination of automatic gages with indicator dials are employed for checking caster, camber, toe-in, king pin inclination and wheel trueness, making this testing and adjusting operation possible without disassembly. For complete details write the Bear Mfg. Co.

MEMA Elections

A. H. Eichholz, general manager of the Motor & Equipment Manufacturers Association, announces that the official tally of the votes cast by members for new directors of the association shows the following as having been elected to the MEMA board for the three-year period of 1937, 1938 and 1939:

J. W. Anderson, president, the Anderson Company, Gary, Ind., to fill the vacancy created by the expiration of the term of C. F. Conn.

J. H. Cattell, general manager, Warner-Patterson Company, Chicago, Ill., to fill the vacancy created by the expiration of the term of G. W. Sherin.

B. G. Gilmore, secretary-treasurer, the Fairmount Tool & Forging Company, Cleveland, Ohio, to fill the vacancy created by the expiration of the term of R. L. Smith.

D. H. Daskal, president, Perfection Gear Company, Harvey, Ill., to fill the vacancy created by the expiration of the term of J. A. Tumbler.

Survey Shows Maintenance Needs

A survey that has just been completed by the National Bureau of Casualty and Surety Underwriters, shows that 75 per cent of all automobiles in operation today—taking both pleasure cars and commercial trucks—are defective in one or more major respects. The survey is said to have included 22,702,000 vehicles, which were inspected for brakes, tires, lights, horns, steering mechanism, windshield wipers and rear vision mirrors. Thirty-nine per cent of the cars inspected were found to have defective brakes, while well over 50 per cent of the cars had tires that were approaching the danger point.

M. E. Coyle (right) accepting congratulations upon the twenty-fifth anniversary of his joining General Motors, Dec. 26

Designer Builds Car As Spare Time Hobby

For over 20 years Benjamin F. Harris, III, of Chicago, has been interested in automobiles and industrial designing. A concentrated effort during spare time over a period of three years has resulted in the design and construction of the Harris Front Drive Special pictured above. While it is just a hobby with Mr. Harris, the car is intended to be a demonstrative example of artistic and functional design ability, as well as mechanical ability and understanding.

It has an 86 in. wheelbase, tread of 50 in., and an over-all length of 12 feet. The over-all height is 43 in. road clearance 6 in., and total weight 1500 pounds. The engine is a specially built V-8, with a bore of 2.2 in. and a stroke of 3 in. It has a displacement of 92 cu. in. and a developed horsepower of 32 at 3200 r.p.m., and is equipped with two dual downdraft Winfield carburetors. Performance figures are given as 90 miles per hour in traffic gearing and 110 miles per hour in speed gearing. Gasoline performance is said to be on the basis of 30 miles per gallon.

Special features include fully retractable headlights, concealed hood catches and locks, independently sprung rear wheels, with the spare wheel, tools and baggage carried inside the body. The exhaust aperture is built in the body.

Guaranteed Adds New Line

Guaranteed Parts Co., Inc., 248 West Fifty-fourth Street, New York City, has announced the addition of Four Star Brand of ignition parts to their line. Four Star parts, described as the Custom Built ignition line, are said to be unconditionally guaranteed.

New 15-Drawer Cabinet

A 15-drawer cabinet containing the entire stock of the Lamson "25" line of automotive fastenings is included with each full-stock order, according to information supplied by The Lamson & Sessions Co., 1971 West 85th St., Cleveland, Ohio. The cabinet is made of 20-gage steel, crackle enameled finish in olive green to match standard steel shelving. Parts are packaged in 25 cent cartons for over-the-counter sales to garages and service stations.

CHARLES EDISON (left), recently appointed Assistant Secretary of Navy, attends the Automotive Service Industries Show. Mr. Edison, son of Thomas Edison, is president of the Thomas A. Edison Industries, West Orange, N. J.

(Right) A new version of an old sport. With this combination of wings and skis, this birdman gains speed far greater than the average skier

(Below) D. E. Ralston, Oldsmobile vice-president and general sales manager, extends greetings over the air in conjunction with Oldsmobile's Christmas Party

New York Show Advanced To October 27 This Year

The National Automobile Show will open two weeks earlier this year, on Oct. 27, and will close Nov. 3, it has been announced by the Automobile Manufacturers Association.

The earlier date is expected to make more efficient the distribution of the special chassis and demonstration units, Alfred Reeves, AMA vice-president, stated.

The show committee in charge of this year's affair includes Alfred H. Swayne (General Motors), chairman, Byron C. Foy (Chrysler), and Paul G. Hoffman (Studebaker), with Alfred Reeves, manager.

Jobber Survey Prepared

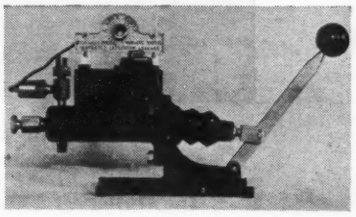
A Wholesalers' Internal Management Survey was presented by Herb Nigg to the wholesalers' division of N.S.P.A. at the recent convention held in Chicago.

Three significant observations included in the survey are that wholesalers are making a slightly higher net profit than in 1931; that overhead is being reduced in line with lower gross margins of profit on leading lines; and that today's near prohibitive ratio between volume of business needed to pay off on a jobber's investment will discourage any substantial increase in the number of new jobbing establishments.

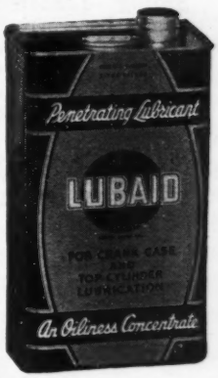
ON view in the automobile section of the New York Museum of Science and Industry, Rockefeller Center, is one of the original electric self-starters invented 25 years ago by C. F. Kettering. The exhibit consists of a control switch, battery and combined starting motor and generator unit and was part of the first production order for use on the 1912 Cadillac. As a reminder of what went before, an old-fashioned crank lies beside the starter.

Signals Brake Failure

Reliable Machine Screw Sales Co., Inc., 123 Sussex Avenue, Newark, N. J., has developed a hydraulic brake fluid leak signal to warn the operator of possible brake failure due to leakage at wheel cylinders or lines, check valve leak in master cylinder, broken master cylinder spring, air in lines or loose fittings. Known as the Robinson Hydraulic Brake Failure Signal, it has a list price of $3.50.



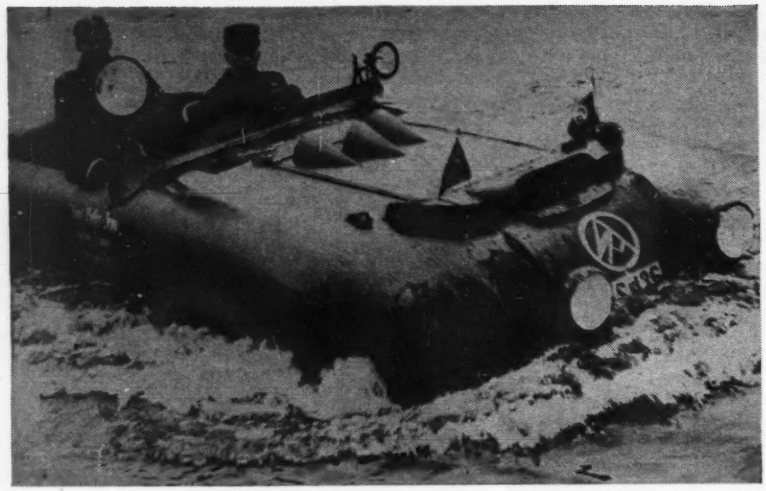
Lubaid Gives Added Protection to Oil



A new product known as Lubaid has been introduced by the Lubaid Co., Milwaukee, Wis. When added to crankcase oil, Lubaid is said to increase the film strength and to provide instant lubrication. Contains no harmful ingredients, and does not dilute the oil already present. Jobbers and dealers are requested to write the Lubaid Company for complete details.

Hein-Werner to Build Machine Shop Addition

Hein-Werner Motor Parts Co., Waukesha, Wis., broke ground for a machine shop addition estimated to cost $30,000 to meet increased demand which in December represented a 75 per cent gain for 1936 over 1935. The firm was founded in Milwaukee in 1919 to manufacture Ford replacement parts, principally water pumps. It moved to Waukesha in 1929 and besides making original and replacement pumps it has been manufacturig hydraulic jacks since 1931.



THE German inventor of this land-water car claims a speed of 90 miles on land and 15 miles an hour on water. It goes from one to the other without mechanical adjustments.

Repairman's Visit To The

FACTORIES

The replacement trade received word last month, that the St. Louis Spring Co., makers of Moog-St. Louis Springs and Moog-St. Louis Piston Rings had moved into its new plant at 6650 Easton Ave., St. Louis, Mo. They have also announced their "1937 Spring Leadership Plans" which might be worth your while writing them about. * * *

Jack Sharp, sales manager, Manley Products Corporation, York, Pa., has announced the appointment of the following representatives—M. H. Battenhouse, Leon A. Hardy, Fred W. Smith and L. T. Niblo.

* * *

R. T. Pierson, vice-president and general manager of USL Battery Corp., announced an employes' bonus equivalent to one week's pay which was paid Dec. 24.

* * *

Howard S. Welch, formerly president of The Studebaker-Pierce Arrow Export Corp. and since 1935 Chief of the Automotive and Aeronautic division of the Department of Commerce, has been named by the Bendix Aviation Corp. to head up its export organization. * * *

Fred Schluter, president of Thermoid, announced the promotion of Sam K. Dennis to the position of director of replacement sales. Mr. Dennis has been with Thermoid 13 years. * * *

At a meeting of the directors of Tuthill Spring Co., Chicago, last month, the regular dividend of 12 per cent was declared and an extra dividend of 12 per cent on the capital stock of the company was also shared.

* * *

J. E. Roberts, vice-president in charge of sales, of the Covered Wagon Co., makers of house type trailers, has made known the appointment of George H. Wright as assistant director of sales. * * *

The directors of Borg-Warner Corp. have declared a regular quarterly dividend of $1 per share on the common stock, made payable Dec. 21, 1936, to stockholders of record Dec. 4, 1936, an increase of 25 cents per share in the regular quarterly dividend rate. The regular quarterly dividend of $1.75 per share on the preferred stock was also declared, payable Jan. 2, 1937, to stockholders of record Dec. 15, 1936.

The directors voted to call all of the remaining outstanding preferred stock, 13,800 shares, for redemption on Feb. 1, 1937.

* * *

L. B. Murphy has been appointed assistant sales manager of the Merchandising division of The Electric Auto-Lite Company, with headquarters in Toledo. Mr. Murphy, who was formerly with Moto-Meter Gauge & Equipment Corporation, LaCrosse, Wis., is associated with Frank Nealon, sales manager of the Merchandising division, and directly concerned with the company's new spark plug.

* * *

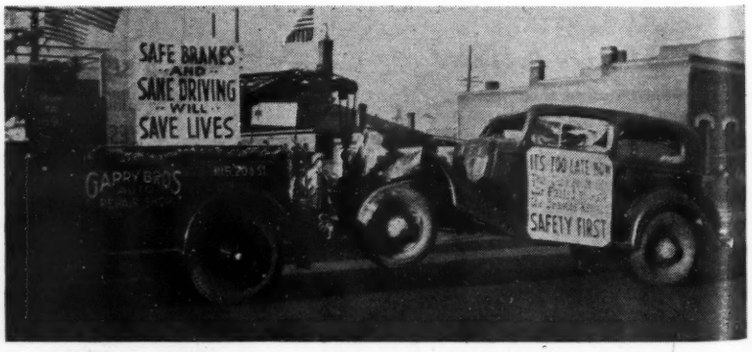
Globe Machinery & Supply Company of Des Moines and Philadelphia recently announced the division of its operations under the head of two new corporations. The Globe Hoist Company has been incorporated to manufacture and distribute Globe Auto Hoists, "Rock-A-Car" Jacks, and other items of garage equipment which have been well known in the Globe line. The other corporation, Globe Machinery & Supply Company, will handle the other divisions of the Globe business, including power plant equipment, plumbing, heating, air conditioning, and insulation equipment. Officers of the Globe Hoist Company include Fred W. Swanson, president and general manager; F. S. Harshbarger, vice-president; Harold A. Bruner, treasurer; and Fred W. Swanson, Jr., secretary.

* * *

An extra dividend of 25 cents a share on the 162,500 shares of common stock has been declared by the Perfect Circle Co. This extra dividend, the second one declared in 1936, was made payable Dec. 22, 1936, to all stockholders of record Dec. 11, 1936.

* * *

Aluminum Industries, Inc., Cincinnati, Ohio, manufacturer of Permite Products, has appointed Ralph W. Doherty of Phoenix, Arizona, to the position of District Manager, replacing J. G. Whalen, who has resigned. The appointment became effective December 1.



GARRY Brothers Garage of Denver entered this "float" in a recent traffic safety parade. A badly battered automobile, comparatively new, was towed in the parade. The sign read "It's Too Late Now—The Owner Of This Car Failed To Have The Brakes Relined"

"Everything points to the Pontiac Franchise as THE BEST BET OF THE YEAR"

Of course, you've heard the trade-talk about Pontiac. Because stories about its sensational climb toward leadership are filling the air today.

You've heard that Pontiac is the "hot line" of 1937. But that's only half the story. *Pontiac production and retail sales are breaking all past records.*

You've heard that the Pontiac franchise now includes larger sliding scale discounts. The whole truth is that only 4 per cent of all automobile manufacturers offer higher discounts than Pontiac, and all these manufacturers build cars with a far lower potential volume!

You've heard that Pontiac has adopted a protected territory policy. There's more to it than that. Pontiac has set up machinery designed to definitely end the evils of cross-selling.

You've heard that Pontiac's "live and let live" policies are creating one of the best satisfied groups of dealers in the industry. The fact is, that Pontiac probably does more than any other company to increase dealers' profits and stabilize their operations.

You know that all those particular Pontiac advantages are enhanced by the phrase, "A General Motors Franchise," which stands the world over for permanence, fair dealing, far-sighted policies and high esteem in the public mind.

So if you are interested in a bigger and better opportunity, we invite you to investigate the possibility of becoming a Pontiac dealer in one of the desirable places still open. Although our present dealer organization is strong and able, we are interested in acquiring more dealers of the same caliber—men who can strengthen our national picture by winning success for themselves. Such men will recognize this as a timely and exceptional opportunity. Inquiries are treated in strictest confidence. Address your letter personally to Mr. C. P. Simpson, General Sales Manager.

PONTIAC MOTOR DIVISION, PONTIAC, MICH.
General Motors Sales Corporation

LARGER SLIDING SCALE DISCOUNTS

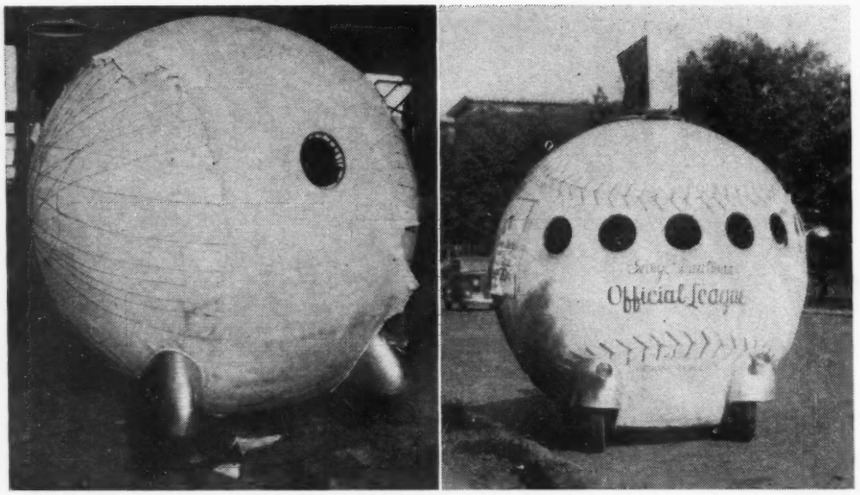
PROTECTED TERRITORY • THE "HOT LINE" OF 1937

RECORD DEALER PROFITS

"LIVE AND LET LIVE" POLICIES

GENERAL MOTORS BACKING

America's Finest Low-Priced Car!



IF Dizzy Dean were to throw this baseball at us, we're sure we could hit it. It's big enough. Covered with twenty-one horsehides, mounted on an automobile chassis, the Big Ball has a public address system inside, which a Kansas City drug chain uses for advertising purposes

U. S. Tires Announce New Distribution Plan

To meet changing business conditions and the new legal requirements imposed by the Robinson-Patman law, United States Rubber Co. has adopted an entirely new distribution plan for 1937.

Instead of buying tires from U. S. Rubber Products, Inc., as is the present practice of dealers handling U. S. tires, they will buy from the U. S. Tire Dealers Mutual Co., a newly formed selling organization for U. S. tires.

The Mutual company will get U. S. tires from the manufacturer, U. S. Rubber Products, Inc., and will have the same purchasing advantages as any other volume purchaser in the replacement field. In other words, Mutual will buy at the same percentage over manufacturing cost as will other large volume accounts. In figuring manufacturing cost, there will be no allowance for volume.

The Mutual company will take over the 28 stores owned by the Products company, other U. S. replacement tire contracts, and all required facilities, inventories and accounts at their cost. Money to finance the Mutual company will be loaned to the Products company at the legal rate of interest. All accounts of the Mutual company will be audited.

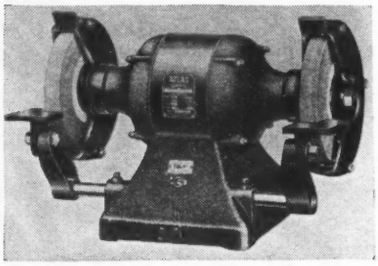
Mutual will sell tires to dealers at prices based on established lists and discounts. It will also select dealers from different parts of the country to serve as an advisory council on tire distribution.

Furthermore, if Mutual has a surplus at the end of the year after paying expenses and interest on borrowed money, and after setting up sound business reserves, the surplus will be distributed on a mutual basis among dealers.

The new plan becomes effective Jan. 1, 1937, and will be in effect during the entire calendar year.

Atlas Has New Bench Grinder

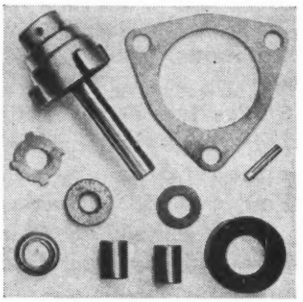
The Atlas Press Co., 1819 North Pitcher Street, Kalamazoo, Mich., has developed a new ½-hp. bench grinder. The motor is completely enclosed, and the heavy ball bearings in the spindle are sealed against wheel dust. The right wheel is used for rougher grades



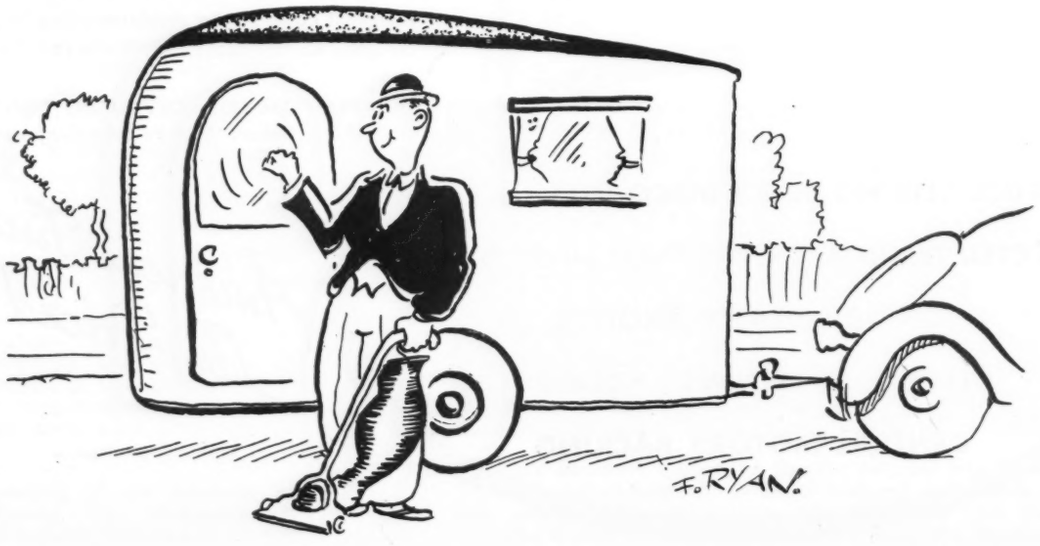
of work and the left for smooth finishing. Adjustable work rests and wheel guards assure safety at all times. Priced at $39.75.

Permite Water Pump Repair Kits

Aluminum Industries, Inc., 2416 Beekman Street, Cincinnati, Ohio, makers of Permite Products, has an-

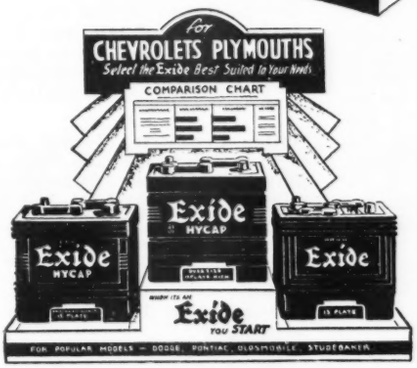


nounced the introduction of water pump repair kits for popular cars. These repair kits contain all the parts needed to completely overhaul a water pump. Illustration shows the parts of the repair kit for Ford V-8 cars.



Why Dealers like EXIDE

...Outstanding product...Coordinated merchandising program



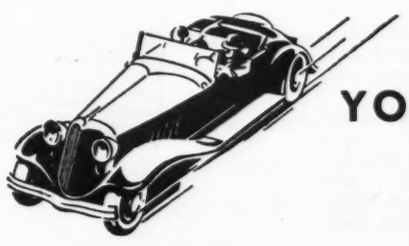
Thousands of dealers, swinging over to Exide, have discovered why the Exide Franchise spells success. For the first time it has offered them, as it offers to every alert, aggressive dealer, a coordinated merchandising plan that brings results in every phase of the battery business—from Service to Sales.

There is the Exide advertising, that finds its way into the homes of an overwhelming majority of car owners and brings them in. There is the Exide service equipment—kit and tester—skillfully worked out to make the battery business easy. It takes the guesswork out of service and testing and substitutes real facts. There are the Exide Automatic Vendors that sell the higher-profit Exide Hycap types—doing it almost automatically. And most important of all, there are the Exide Batteries, in types designed for the needs of today's cars and today's battery buyers—backed by Exide's reputation and long experience. They stay sold!

Start this powerful selling combination working for you. Get in touch today with your Exide Wholesaler, or write direct to us.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

WHEN IT'S AN EXIDE



YOU *START*

H. C. Acton, of the Super-Service Garage, Douglas, Mich., claims to have the largest capacity wrecker in the State of Michigan. It's an 8-ton job, with three winches and a nigger-head operating four lines independently or together. It's running speed is approximately 70 m.p.h. "And," says Mr. Acton, "we haven't found anything too heavy for it."

Briggs-Motor Products Merger

Merger negotiations were under way between officials of the Briggs Manufacturing Co. and the Motor Products Co. looking to a merger, according to an announcement made in New York Dec. 10. The merger has been agreed upon in principle, it is understood, and only the details need be worked out, subject to approval by the directors and stockholders of the two corporations.

The Briggs company is the largest independent automobile body manufacturer, supplying Ford, Lincoln Zephyr, Plymouth and Dodge. Motor Products makes a variety of metal parts for automobiles and serves Ford, Chrysler, Hudson, Packard and Studebaker. Both plants occupy adjacent properties in Detroit.

It is assumed that the merger will be accomplished by an exchange of stock, although the basis of such an exchange has not been divulged.

Fuel Expert Discusses 1937 Compression Ratios

Compression ratios in 1937 will be lower in racing cars and higher in stock cars, according to B. R. Jones, field representative of the Ethyl Gasoline Corp. This "seeming paradox," Mr. Jones points out, is brought about, on the one hand, by the insistent general demand for improved performance and greater economy, and, on the other, by a ruling that the fuel used in next year's Memorial Day Classic at the Indianapolis Speedway must "come from the same pumps that serve the motoring public." In racing circles, he says, a tremendous loss of power is foreseen.

"During the past three years the quantity of fuel consumed by each car at Indianapolis has been limited," Mr. Jones explains, "but there has been no regulation as to the type or quality of gasoline used. For example, in the 1934 race the allowable fuel was 45 gal., in 1935 it was 42½ gal., and in the 1936 race it was only 37½ gal.

"To meet this exacting demand for economy, compression ratios were sharply increased until the average ratio was approximately 12 to 1, and fuels containing the maximum effective amount of Ethyl fluid, the anti-knock rating being around the 100 octane number, were used. The success of this battle for economy is attested to by the fact that Louis Meyer won the race this year with a compression ratio of 13 to 1, averaging almost 15 miles per gal. at a speed of approximately 109 m.p.h.

"Now, for 1937, the rules committee of the Contest Board of the American Automobile Association, has seen fit to remove the limit as to the amount of fuel used by the cars competing in the 500-mile race next May 30, but has specified that the fuel must come from 'the same pumps that serve the motoring public.'

"As yet rules have not been drawn up for the purpose of defining this new fuel regulation. However, it may be assumed that fuels of not over 80 octane rating will be used in the 1937 classic.

"To date, no tests have been made to determine what compression ratio may be feasible for these racing motors to operate satisfactorily on an 80 octane fuel. Some members of the racing fraternity have expressed the thought that one of racing's most popular powerplants will have to be lowered to about an 8 to 1 compression ratio in order to operate satisfactorily on the specified fuel. This means a drop of about three full ratios and will, of course, result in a tremendous loss of power."

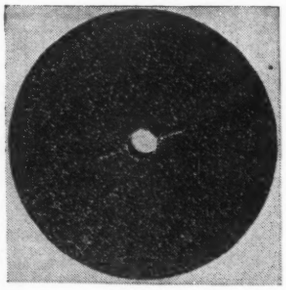
New Wrench For 10 mm. Spark Plugs

Bonney Forge & Tool Works, Tilghman and Meadow Streets, Allentown, Pa., has recently announced a wrench to remove and install the 10 mm. spark plug. It is made of chrome-vanadium steel, chromium plated, with

heads buffed to a high, permanent luster. One end of the wrench is equipped with a 9/16-in. double-hexagon opening that fits over the spark plug. The other end has a bit or blade for inserting or removing the adaptors for 10 mm. plugs. This wrench, known as No. 2595, is for use with a 5/16-in. round handle.

Openkote Sanding Disk

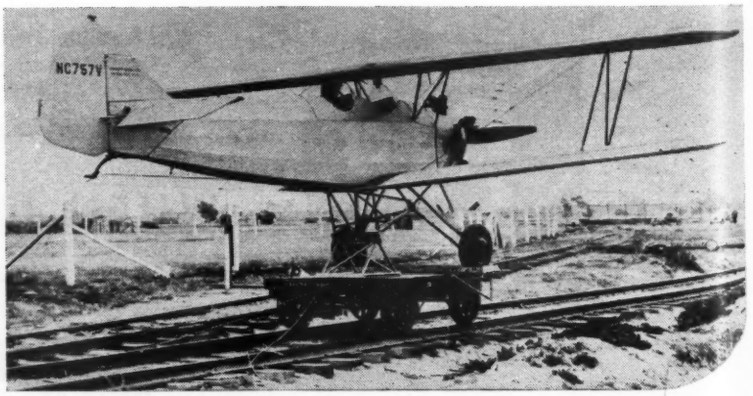
Behr-Manning Corp., Troy, N. Y., has developed a new metal sanding disk in which the abrasive grains are deposited in such a manner that open



spaces are provided between them for the clearance of the rapidly accumulating debris of sanding. It is claimed that such a coating is bound to cut cooler, and hold its cut longer because of its slower loading feature.

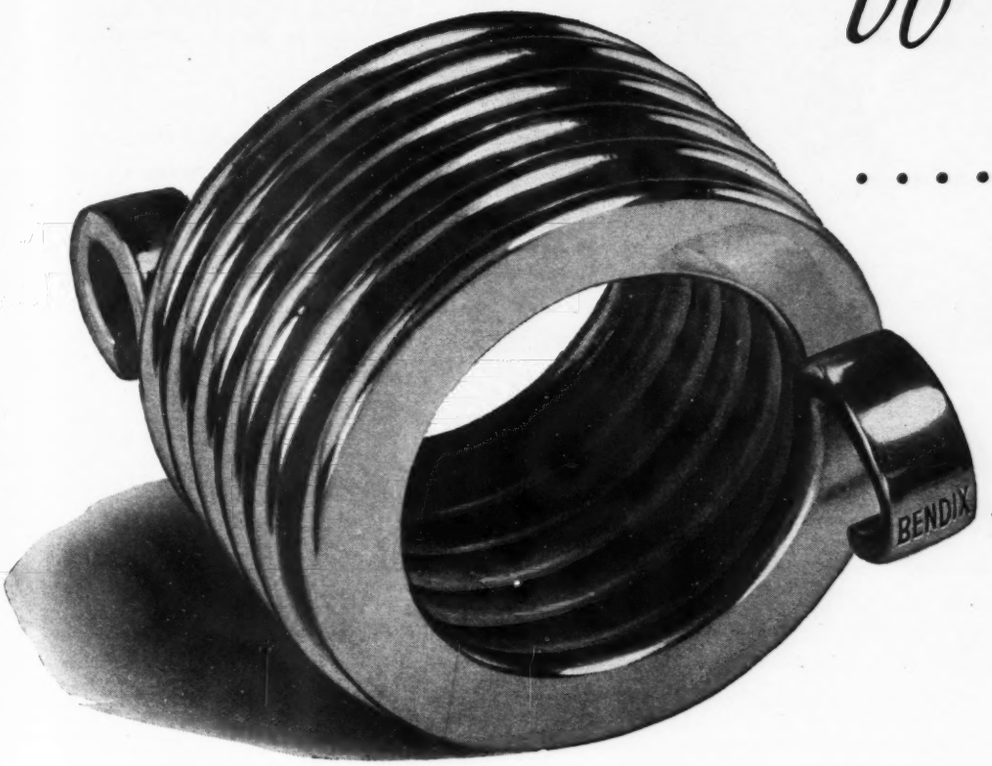
Offer Complete Muffler Catalog

The AP Parts Corp., 1801 Speilbusch Ave., Toledo, Ohio, manufacturers of AP mufflers, has recently announced their new 1937 AP Muffler Catalog No. 12, describing their complete line of mufflers and muffler tail pipes. Additions to the AP set-up include three new interchangeable mufflers, and factory duplicate type mufflers for popular models. Catalog is complete, showing 1937 model applications.



W. B. WHEATLEY, chief test pilot for a San Diego, Calif., aircraft concern, is shown in his biplane about to be catapulted from a railroad handcar into the air.

There is a **MARKED** *difference*



. . . . and

That's why . . . it is important to use only genuine

BENDIX DRIVE SPRINGS

When you have occasion to replace a Bendix Drive Spring, there's only a very small sum of money involved in the spring itself . . . but labor costs amount to more. So don't experiment with unknown springs—and perhaps have the job to do all over again!

Bendix, who invented and builds the world-famous Bendix Drive, knows *exactly* what the spring should be. The precise steel formula, tension, temper, shape and dimensioning have been developed during many years of building Bendix Drives for many million motor cars.

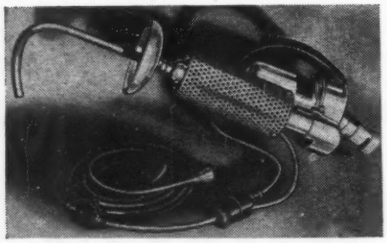
Every genuine Bendix Drive Spring is marked plainly with the name "BENDIX," stamped into the "eye." Look for it. It's there to protect you.

ECLIPSE MACHINE COMPANY
ELMIRA, NEW YORK
(Subsidiary of Bendix Aviation Corporation)

BE KIND TO TRAFFIC COPS, at least that's the feeling of the Italian motorists who bring Epiphany gifts (mostly liquid) to the strong arms of the traffic, once a year.

Combination Heat Gun And Vacuum Cleaner

The Appliance and Merchandise Department of the General Electric Co., 1285 Boston Avenue, Bridgeport, Conn., has developed a combination heat gun and hand vacuum cleaner.



The heater unit attaches to the exhaust orifice of the cleaner and offers a simple, practical method of thawing out transmissions, differentials, radiators and for drying out wet ignition systems.

Registration Count for 1936 at Record Peak

More motor vehicles were registered in the United States by the end of the year 1936 than in any previous year. This fact is made evident by a survey which places the preliminary total for the year at 28,424,077 vehicles, while advancing the possibility that official figures, available several months from now, may push the total to 28½ million on the basis of previous statistical experience with these data.

This survey has been made possible by the cooperation of the motor vehicle commissioners of the various states and is the result of actual returns to date plus an estimate for the balance of the year.

Total registrations in this country increased each single year from 1895 to 1930, the year following the peak year in sales. Declines were registered during the subsequent three years. An increase in 1934 brought the total back to a figure beyond the 1928 mark, and another increase last year returned the total close to the 1929 figure.

The previous high of 26,657,072 was reached during 1930, but according to our preliminary figures this record has now been passed by at least 1,750,000, and the registrations of 1935 which amounted to 26,147,286 have been increased by about 2,278,000 units.

39 Attend Sealed Power's Annual Sales Conference

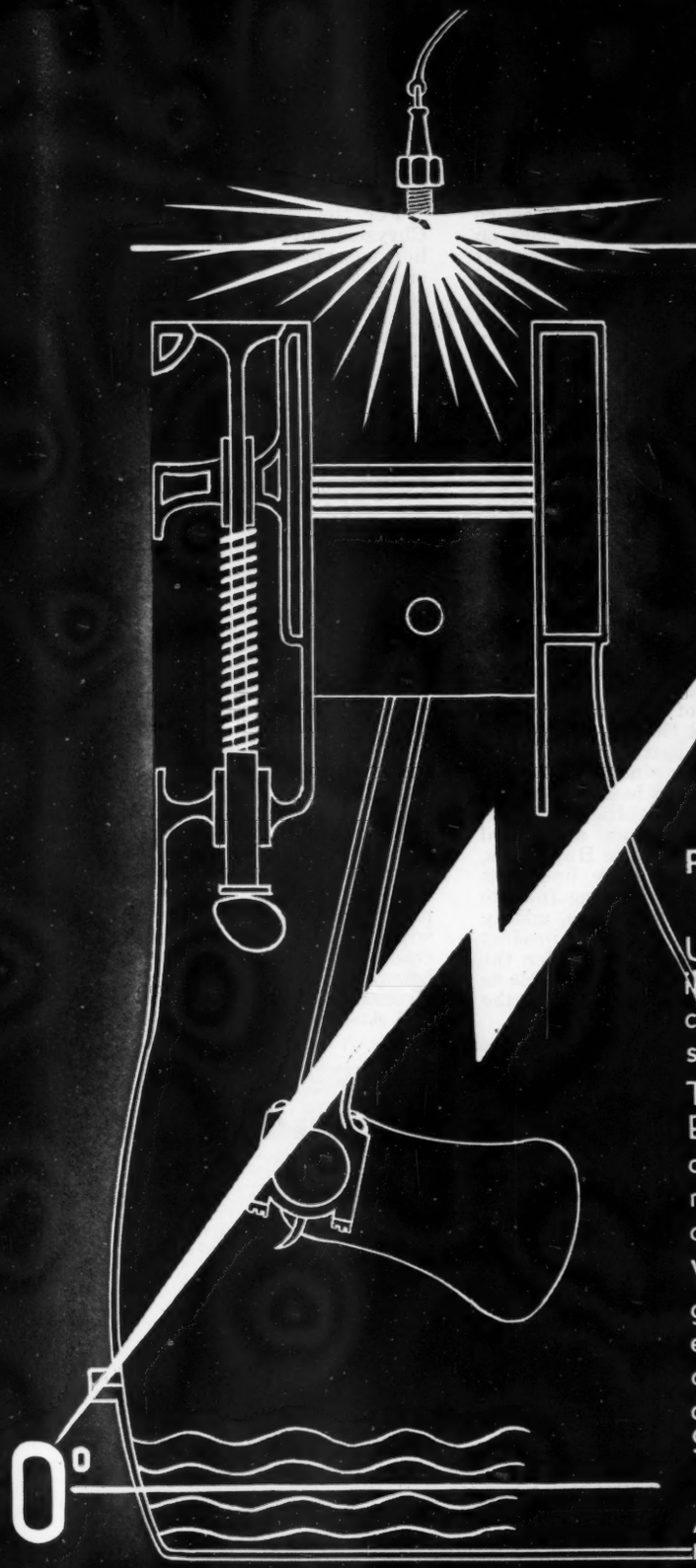
Thirty-nine members of Sealed Power Corporation of Muskegon, Mich., including executives, engineers, district managers and salesmen, attended the annual sales conference held on Dec. 7 and 8, at the Hotel Stevens. Neil Moore, general manager, and John Norwood, sales promotional manager, conducted the sessions. Sales, merchandising and advertising plans for 1937 were discussed. Mr. Moore said that in number of rings sold as well as in dollar volume the year 1936 will exceed even 1929.

The advertising program for 1937 was presented by W. H. Fetridge of Roche, Williams & Cunnyngham, Inc.

Estimated Motor Vehicle Registrations—1936

	Passenger Cars 1936	Trucks & Buses 1936	TOTAL MOTOR VEHICLES 1936	TOTAL MOTOR VEHICLES 1935	Percent Increase 1936 over 1935
Alabama ‡	226,444	44,698	271,142	242,204	12.0
Arizona	101,281	21,905	123,186	103,122	9.7
Arkansas	180,000	45,000	225,000	211,103	6.8
California§	2,280,000	145,000*	2,425,000	2,150,740	13.0
Colorado	277,764	29,894*	307,658	284,578	8.3
Connecticut	360,000	60,000	420,000	366,115	14.9
Delaware	49,895	10,140	60,035	56,486	6.5
District of Columbia	192,668	22,098	214,766	170,907	26.6
Florida	318,431	64,291	382,722	356,244	7.6
Georgia	339,000	73,545*	412,545	394,096	4.7
Idaho	102,000	22,400	124,400	116,500	7.0
Illinois	1,465,000	217,000	1,682,000	1,533,752	9.9
Indiana	815,000	155,000	970,000	804,900	20.8
Iowa	646,170	84,214	730,384	696,535	4.9
Kansas	500,000	85,000	585,000	553,106	5.8
Kentucky	315,000	53,000	368,000	343,150	7.2
Louisiana	224,800	74,000*	298,800	273,050	9.7
Maine	150,000	41,000	191,000	179,275	6.8
Maryland	295,641	54,431	350,072	344,581	1.6
Massachusetts	725,640	104,561	830,201	785,672	5.8
Michigan	1,239,000	140,000	1,379,000	1,239,431	11.5
Minnesota	665,000	114,245	779,245	726,711	7.1
Mississippi	164,000	35,500	199,500	186,289	7.1
Missouri	680,000	125,000	805,000	766,369	5.1
Montana	128,000	39,400	167,400	149,712	12.0
Nebraska	435,000	61,310	496,310	407,903	21.9
Nevada	30,600	7,900	38,500	35,435	8.9
New Hampshire	97,500	23,500	121,000	113,725	6.6
New Jersey	815,272	135,003	950,275	887,611	7.1
New Mexico	85,000	22,600	107,600	91,436	17.8
New York	2,100,000	364,400	2,464,400	2,354,842	5.0
North Carolina	437,000	63,000	500,000	462,997	8.2
North Dakota	138,000	30,100	168,100	164,217	2.5
Ohio	1,600,000	170,000	1,770,000	1,686,877	5.1
Oklahoma	440,000	86,500	526,500	502,100	5.0
Oregon	275,000	54,750	329,750	297,112	11.0
Pennsylvania	1,636,079	284,145	1,920,224	1,745,404	10.1
Rhode Island	140,483	19,958	160,441	149,906	7.0
South Carolina	220,000	31,500	251,500	235,919	6.8
South Dakota	155,720	29,048	184,766	179,250	3.3
Tennessee	332,000	44,000	376,000	352,261	7.0
Texas	1,200,000	304,000	1,504,000	1,366,017	10.2
Utah	113,000	22,685	135,685	107,261	26.8
Vermont	75,000	8,712	83,712	80,671	4.0
Virginia	340,700	63,100	403,800	378,014	6.9
Washington	405,000	72,000	477,000	453,871	5.1
West Virginia †	216,652	37,520	254,172	240,012	6.0
Wisconsin	670,200	151,086	821,286	749,602	9.8
Wyoming	61,000	16,000*	77,000	70,215	9.8
TOTALS	24,459,940	3,964,137	28,424,077	26,147,286	8.8

* Buses included with passenger cars.
† For fiscal year ending June 30, 1936.
‡ For fiscal year ending Sept. 30.
§ Passenger cars include approximately 120,000 light commercial vehicles.



FROM 0° TO 3000° IN THE FIRST REVOLUTION

Using zero as a symbol for Winter weather, the illustration shows the conditions which oil must combat during cold morning starts - and cold starts throughout the day.

This is a *shock* condition of the worst kind. Engineers estimate that 75% of all wear occurs during this period. A lapse of from 5 to 20 minutes takes place before complete circulation of the oil is effected.

With the use of an oil containing "dag" colloidal graphite, wear during these moments can be effectively reduced. The self-lubricating graphoid surface formed on the friction parts is a definite safeguard during the warm-up period. Send for a copy of the "cigarette paper test".

Ask your oil supplier about his colloidal-graphited oils today

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

REG. U. S. **dag** PAT. OFF
COLLOIDAL PRODUCTS

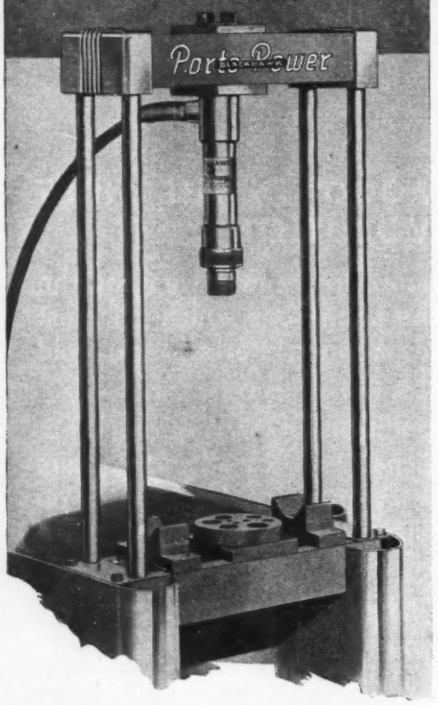
COPYRIGHT 1936 ACHESON COLLOIDS CORP

COLLOIDAL GRAPHITE

"DAG" COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

THE Workshop End OF Porto-Power

4 COLUMN PRESS WITH POWERFUL HYDRAULIC RAM



Here's a Close-Up of the New S-100 Porto-Power Press:

Bigger — greater strength and capacity — more uses. Four-column type — sliding ram head with provision for locking ram at any desired point. Top and base made of steel rectangular sections so "V" blocks, plates or other accessories can be moved to line-up with ram. Press has 15" clear width between posts — and 15" clearance from base to ram plunger (collapsed). 3½" between bars permits inserting long workpieces. Ample space below press provided by special design of Porto-Power stand.

BLACKHAWK MFG. CO.
Dept. MA-1 MILWAUKEE, WIS.

BLACKHAWK Porto-Power

Hupp Refinancing Plan Offered Stockholders

The Hupp Motor Car Corp. called a special meeting of stockholders on Jan. 7, 1937, at Richmond, Va. At that meeting there was to be submitted a plan for revision of capital which will include cancellation of 193,464 shares of treasury stock and reduction of authorized capital from 2,000,000 shares at $10 a share to 1,000,000 shares of $1 par value, and the exchange by stockholders of their present stock for new stock on the basis of four to one. This would leave outstanding in hands of present stockholders 329,657 shares and will leave authorized but unissued 670,343 shares. Stockholders were to be asked to authorize directors to sell this unissued stock, the stockholders having prior right to subscribe to it pro rata based on their present holdings, which will give them the right to take approximately two shares of this new stock for each share of their holdings.

This revision of the capital stock is asked to permit the management to pursue plans for getting new money into the corporation, since it has found that no progress can be made on the basis of the present capital structure.

The management has announced that it has redesigned the Hupp cars, providing a complete new line with new body designs conforming fully to the latest trend in car styles, adding many features that bring the product fully up to the standard set for the 1937 market. It expects to be able to market these new cars well within the medium-price range.

Chrysler Builds First "Million Cars In One Year"

For the first time in its history, Chrysler Corp. has produced one million passenger cars and trucks within one year. The millionth car this year came off the assembly lines Dec. 15 at the Plymouth plant in the presence of Walter P. Chrysler, chairman of the board; K. T. Keller, president; B. E. Hutchinson, chairman of the finance committee; F. M. Zeder, vice-chairman of the board; J. E. Fields, president, Chrysler Sales Corp.; B. C. Foy, president, De Soto Motor Corp.; D. S. Eddins, president Plymouth Motor Corp.; and A. vanDerZee, general sales manager, Dodge Brothers Corp. Fourth quarter output alone will be 270,000 cars, a gain of 11 per cent over 1935.

The largest previous annual production was 843,599 units for the year 1935. This year's million to date, with all plants in full operation, is more than twice the company's total annual production of 1929.

Trade Show at Kansas City

The Third Annual Midwest Automotive Trade Show under the sponsorship of the Automotive Trades Assn. of Greater Kansas City, through its jobber division, will take place March 25-28, 1937. The "clinic" which is attended by members of the trade from Missouri, Kansas, Oklahoma, Texas, Colorado, Iowa and Nebraska, will be held in the Municipal Auditorium, Kansas City, Mo.

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New BEAUTY
STREAMLINED

New POWER
STURDIER STRONGER

New USES
MORE THAN EVER

IN less than two years Blackhawk Hydraulic Porto-Power — sensational workshop-on-wheels — has established a remarkable record for doing body and frame work, straightening, pushing, bending, pressing, pulling, and hundreds of other jobs, on cars, trucks and buses.

Now comes the Porto-Power S-100! Larger — sturdier — streamlined — with improved features and accessories including Blackhawk's new and exclusive "Flex-Heads." As completely modern in design as in increased capacity for getting work done faster and better!

The New S-100 Porto-Power has the convenient all-directional remotely controlled portable hydraulic ram — ultra-modern electrically welded steel stand with rubber-matted steel drawer and upper and lower accessory trays—new 4-column press with many improvements and advantages.

Mere words can't describe the many uses of the S-100 Porto-Power. Garage, body-shop, service station operators—and all others doing repair and maintenance work are invited to ask jobber salesmen for demonstrations. Send for new booklet, "Crash Profits."

BLACKHAWK MFG. CO.,
Dept. MA-1 **Milwaukee, Wis.**

Exclusive Canadian Distributor:
The Canadian Fairbanks-Morse Co., Limited
Branches in All Principal Cities

BLACKHAWK
Porto-Power
BLACKHAWK MFG. CO.
MILWAUKEE, WIS.
U. S. A.

BLACKHAWK
Porto-Power

TRAFFIC experts believe that sodium street lighting is a means to safer night driving—and these lights are being introduced along important highways throughout the country. Above is a night view of a three-mile stretch on the Pacific highway, near Seattle

Lodde Heads Kansas City Automotive Trades Assn.

At the annual meeting of the Automotive Trades Association of Greater Kansas City, Kansas City, Dec. 17, Fred Lodde of Lodde Brothers Tire Co. was elected president of the association for 1937. Others elected to the new Board of Directors are:

Joe Butler, Federal Garage, vice-president for the Maintenance division; Joe Myers, Pickwick Garage, vice-president for the Storage and Parking division; Frank Allison, Allison Rubber Co., vice-president for the Tire and Battery division; Orville Gault, General Auto Parts Co., vice-president for the Jobber division; Larry Burns, Burns & Young Motor Service, secretary; Arthur Herzmark, Herzmark Auto Service, treasurer; Ross Patrick, Patrick Motors Co., sergeant-at-arms.

Directors are J. E. "Stoney" Barr, Myers Motor Supply Co.; George Winters, Winters Service; Jess Buster, Empire Garage Co.; Fred Wamsley, Wamsley Tire & Battery Service; C. B. Berg, The Motor Inn; Mike Marino, Mike Marino Garage, and Fred Warwick, Congress Garage.

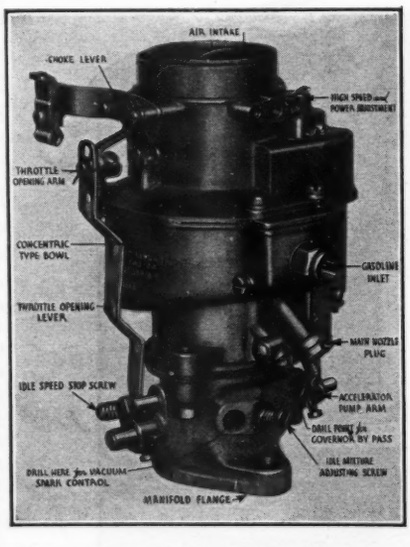
Bear Sales Conference

The Bear Manufacturing Company conducted a general sales conference and convention for its 40 factory representatives, Dec. 6-8. Accomplishments of the past year, biggest in the Bear Company's history, were reviewed. Sales plans and new Bear equipment for the coming year were discussed.

With intensive training on new products and a dash of social activity on the side, this convention was reported to be one of the most successful ever conducted by the Bear organization.

Linkert Carburetor Has New Features

The Langsenkamp-Linkert Carburetor Co., 1200 Shelby St., Indianapolis, Ind., has just announced a new 1937 Concentric Bowl Downdraft carburetor. The fuel chamber completely surrounds the body of the carburetor.

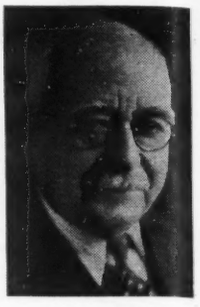


This guarantees a constant fuel level at all angles and results in greatly improved performance and the best possible economy, according to the manufacturer.

3-in-1 Schrader Merchandiser

A. Schrader's Son Division of Scovill Mfg. Co., 470 Vanderbilt Ave., Brooklyn, N. Y., has recently announced their new No. 8800 Display Merchandiser, as a novel combination sales help and package unit. The display is colored red, yellow and blue, and offers three important tire service items for sale from the one unit. It is convenient to use and can be refilled from the standard packages when empty.

Ahlberg Bearing Co. Announces Expansion



Final negotiations have just been completed for the acquisition of a new factory building by the Ahlberg Bearing Company, Chicago. The plant, located at the southeast corner of 47th and Whipple Streets, is a modern building of nearly 72,000 sq. ft., with a sprinkler system, and is located on over 110,000 sq. ft. of land with a railroad siding.

According to Charles J. Bender, president and founder, the Ahlberg Bearing Company was started in 1909 at 16th Street and Michigan Avenue, and has ever since had a normal, healthy growth. The present factory site is at 321 East 29th Street, which building they erected in 1919.

Recent developments perfected by the company, along with generally improved conditions, have necessitated stepping up output to meet demands from regular customers.

The company has national distribution through its 28 owned and operated branch warehouses, and an affiliated company on the West Coast with five warehouses. Present plans indicate full production in the new building will be attained by May 1.

NAPA Regional Conferences

The National Automotive Parts Assn. will hold 10 regional jobber conferences in February and March, it was announced following the annual meeting of the organization in Chicago last month.

The cities in which the 1937 conferences will be held, with the dates of each conference are shown below:

Kansas City	February 22-23
Dallas	February 25-26
Los Angeles	March 1-2
San Francisco	March 5-6
Portland	March 9-10
Denver	March 15-16
Chicago	March 19-20
Pittsburgh	March 22-23
New York	March 25-26
Atlanta	March 29-30

At the annual meeting in Chicago, A. F. Baxter was elected President of the National Automotive Parts Association; Carlyle Fraser, Vice-President; and Henry Lansdale, Vice-President and General Manager. Mr. Baxter is president of the Unit Parts Corporation of Buffalo, N. Y. He succeeded Mr. W. W. Martin, President of the Superior Motor Parts Coporation of Pittsburgh, Pa. Mr. Fraser is President of the Genuine Parts Company of Atlanta, Ga.

Other directors of the organization elected were Mr. W. W. Martin; Mr. E. S. Baldwin, President of the Automotive Parts Company, Columbus, Ohio; Mr. R. W. Boozer, President of Central Motor Parts Company, Inc., of Indianapolis; and Mr. C. C. Colyear, President of Colyear Motor Sales Company, Los Angeles.

"THE BIGGEST SURE-FIRE HITS I'VE SEEN IN TWENTY YEARS!"

OLDSMOBILE dealers long in the business look upon the 1937 Oldsmobiles as the greatest profit winners in their experience. They point to the enthusiastic reception which has greeted the distinctive new Six and the distinguished new Eight in their communities . . . the increased volume of orders they are booking . . . the higher percentage of "clean deals" they are making . . . the profitable "trades" they can select. And they look with satisfaction on a franchise that is known everywhere as one of the fairest and most liberal in the industry. If you are interested in a sure-fire business opportunity, investigate the Oldsmobile franchise—at your earliest opportunity!

OLDSMOBILE 6 AND 8

THE CARS THAT HAVE EVERYTHING

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-door Sedan	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE: No. of Cylinders, Bore and Stroke	Taxable H.P.	Piston Displacement (Cu. Ins.)	Maximum Brake H.P. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor††	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	CHASSIS: Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	American-Bantam			4.75/16	4-2.2x3	7.8		20-4000					CS					A		P					C
2	Auburn 654		120	6.00/16	6-3 1/16 x4 3/4	22.5	209.9	85-3500	6.20	37.4	Al	Whit	Al	Pur	AC	Str	Buf	A	USL	P.Long	WG	Nb-Mec	1/2 Col	4.44	C
3	Auburn 852		127	6.50/16	8-3 1/16 x4 3/4	30.0	279.9	115-3600	6.50	41.4	Al	Whit	Al	Pur	AC	Str	Buf	A	USL	P.Long	Det	Nb-Mec	1/2 Col	4.08	C
4	Auburn SC852		127	7.00/16	8-3 1/16 x4 3/4	30.0	279.9	150-4000	6.50		Al	Whit	Al	Pur	AC	Str	Buf	A	USL	P.Long	Det	Nb-Mec	1/2 Col	4.08	C
5	Buick 37-40		122	6.50/16	8-3 3/32 x4 1/8	30.6	248.0	100-3200	5.70	39.6	CI	LB	Ala		AC	Str	Wal	D	Del	P.Own	Own	m-Spi	1/2 Own	4.40	IC
6	Buick 37-60		126	7.00/15	8-3 1/16 x4 1/8	37.8	320.2	130-3400	5.75		CI	LB	Ala		AC	Str	Wal	D	Del	P.Own	Own	m-Spi	1/2 Own	3.90	IC
7	Buick 37-80		131	7.00/16	8-3 1/16 x4 1/8	37.8	320.2	130-3400	5.75	40.7	CI	LB	Ala		AC	Str	Wal	D	Del	P.Own	Own	m-Spi	1/2 Own	4.22	IC
8	Buick 37-90		138	7.50/16	8-3 1/16 x4 1/8	37.8	320.2	130-3400	5.75		CI	LB	Ala		AC	Str	Wal	D	Del	P.Own	Own	m-Spi	1/2 Own	4.62	IC
9	Cadillac V8-60 & 65		124, 131	(t)	8-3 1/2 x4 1/2	39.2	346.0	135-3400	6.25		CI	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	1/2 Own	(w)	IC
10	Cadillac V8-70 & 75		131-38	7.50/16	8-3 1/2 x4 1/2	39.2	346.0	135-3400	6.25		CI	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	1/2 Own	(v)	IC
11	Cadillac V12-85		138	7.50/16	12-3 1/8 x4	46.9	368.0	150-3600	6.00		CI	Mor	Ala	Han	AC	DL	Own	D	Del	P.Long	Own	Nb-Mec	1/2 Own	4.60	IC
12	Cadillac V16-90		154	7.50/17	16-3x4	57.6	452.0	185-3800	6.00		CI	Mor	Ala	Han	AC	DL	Own	D	D	dp.Own	Own	Nb-Mec	3/4 Own	4.64	IC
13	Chevrolet Master		112 1/4	6.00/16	6-3 1/16 x3 3/4	29.4	216.5	85-3200	6.25		CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	1/2 Own	3.73	Con
14	Chevrolet Mas.DeL		112 1/4	6.00/16	6-3 1/16 x3 3/4	29.4	216.5	85-3200	6.25		CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	1/2 Own	4.22	IKa
15	Chrysler Roy. C-16	910	116	6.25/16	6-3 3/16 x4 1/4	27.3	228.1	93-3600	6.50		CI°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	IC
16	Chrysler Imp. C-14	1100	121	6.50/16	8-3 1/4 x4 1/8	33.8	273.8	110-3600	6.70		Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	IC
17	Chrysler.Cus.Im.C-15	2960	140	7.50/16	8-3 1/4 x4 1/8	33.8	323.5	130-3400	6.50		Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	Ot	Nb-UP	1/2 Own	4.55	IC
18	Chrysler.Airflow C-17	1610	128	7.50/16	8-3 1/4 x4 1/8	33.8	323.5	130-3400	6.50		Al	Mor	Ala	Pur	AC	Str	Bur	A	Wil	P.B&B	Ot	Nb-UP	1/2 Own	4.30	C
19	Cord 812		125	6.50/16	8-3 1/2 x3 3/4	39.2	288.6	115-3600	6.30		Al	Whit	Al	No	AC	Str	NS	A	USL	P.Long	Own	Ben	Tu Own	4.70	IT
20	De Soto Airstream 6		116	6.00/16	6-3 3/16 x4 1/4	27.3	228.1	93-3600	6.50		CI°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B		Nb-UP	1/2 Own	4.10	IC
21	Dodge Six		115	6.00/16	6-3 1/4 x4 3/8	25.3	217.8	87-3600	6.50		CI	Mor	Als	Pur	AC	Str	NS	A	Wil	P.B&B		Nb-UP	1/2 Own	4.10	C
22	Duesenberg J		142-153 1/2	7.00/19°	8-3 3/4 x4 3/4	45.0	419.7	320-4200	5.20		CI	LB	Al	Pur	Yes	Str		D	Exi	dpLong	Own	m-Spi	1/2 Own		
23	Ford V8-60		112	5.50/16	8-2.6x3.2	21.6	136.0	60-3500	6.6		Al	Gear	CS	No	Yes	Str	Own	O	Own	P	Own	m-Spi	3/4 Own	4.44	Tr
24	Ford V8-85		112	6.00/16	8-3 1/16 x3 3/4	30.0	221.0	85-3800	6.12		Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	3.78	Tr
25	Graham 85		111	5.25/17	6-3x4	21.6	169.6	70-3500	6.80		Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Ill	WG	Nb-UP	1/2 Spi	4.55	C
26	Graham 95		116	6.00/16	6-3 1/4 x4	25.3	199.1	85-3800	6.70		Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.45	C
27	Graham S.C. 116		116	6.25/16	6-3 1/4 x4	25.3	199.1	106-4000	6.70		Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.27	C
28	Graham S.C. 120		116-120	6.50/16	6-3 1/4 x4 3/8	25.3	217.8	116-4000	6.70		Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.27	C
29	Hudson 6-73		122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25		CI°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	1/2 Own	4.11	C
30	Hudson 8, 74-5-6-7		122, 129	6.25/16	8-3x4 1/2	28.8	254.0	122-4200	6.25		CI°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	1/2 Own	4.11	C
31	La Salle V8, 37-50		124	7.00/16	8-3 3/8 x4 1/2	36.4	322.0	125-3400	6.25		CI	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	1/2 Own	3.92	IC
32	Lincoln Zephyr		122	7.00/16	12-2 3/4 x3 3/4	36.3	267.3	110-3900	6.7		Al	Gear	CS		Yes	Str	Own	O	Own	P.Os	Own	m-Own	3/4 Own	4.44	Tr
33	Lincoln V12		136-145	7.50/17	12-3 1/2 x4 1/2	46.8	414.0	150-3400	6.38	41.5	Ala	Ch	Ala	Pur	Yes	Str	Own	A	Exi	P.Long	Own		FF Tim		
34	Nash Amb. 6, 3720		121	6.25/16	6-3 3/8 x4 3/8	27.3	234.8	93-3400	5.67		CI	Whit	Als	BS	Bur	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11	C
35	Nash Amb. 8, 3780		125	7.00/16	8-3 1/8 x4 1/4	31.2	260.8	105-3400	5.64		CI	Dia	Als	BS	AC	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.10	C
36	Nash Lafay. 400-3710		117	6.00/16	6-3 3/8 x4 3/8	27.3	234.8	90-3400	5.61		CI	Whit	Als		Bur	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11	C
37	Oldsmobile F37		117	6.50/16	6-3 7/16 x4 1/8	28.4	229.7	95-3400	6.10		CI	Whit	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37	IC
38	Oldsmobile L37		124	7.00/16	8-3 1/4 x3 7/8	33.8	257.1	110-3600	6.20		CI	LB	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37	IC
39	Packard 115C	995	115	6.50/16	6-3 7/16 x4 1/4	28.3	237.0	100-3600	6.30		CI	Mor	Als	No	AC	CG	Old	D	Wil	P	Own	Nb-Mec	1/2 Own	4.36	IC
40	Packard 120C	1170	120	7.00/16	8-3 1/4 x4 1/4	33.8	282.0	120-3800	6.50	41.8	Al	Mor	Als	No	AC	SC	Old	A	PD	P	Own	Nb-Mec	1/2 Own	4.09	IC
41	Packard 1500, 1, 2	2480	127-34-39	7.50/16	8-3 1/2 x5	32.5	320.0	130-3200	6.50		Al	Mor	Als	Pur	AC	Str	Old	D	PD	P	Own	Nb-UP	1/2 Own	4.69	IC
42	Packard 1506, 7, 8	3670	132-39-44	8.25/16	12-3 7/16 x4 1/4	56.7	473.0	175-3200	6.40		Al	Mor	Als	Pur	AC	Str	Old	D	PD	P	Own	Nb-Spi	1/2 Own	4.41	IC
43	Pierce-Arrow 1701		138-144	7.00/17	8-3 1/16 x5	39.2	385.0	150-3400	6.40		Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	1/2 Own	4.58	C
44	Pierce-Arrow 1702		138-144	7.50/17	12-3 1/2 x4	58.8	462.0	185-3400	6.40		Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	1/2 Own	4.58	C
45	Pierce-Arrow 1703		147	7.50/17	12-3 1/2 x4	58.8	462.0	185-3400	6.40		Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	1/2 Own	4.58	C
46	Plymouth P3		112	5.50/16	6-3 1/16 x4 3/8	23.4	201.3	82-3600	6.70		CI	Mor	Ala	No	BA	Car	NS	A	Wil	P	Own	Nb-UP	1/2 Own	3.90	C
47	Plymouth P4		112	6.00/16	6-3 1/16 x4 3/8	23.4	201.3	82-3600	6.70		CI	Mor	Ala	Pur	BA	Car	NS	A	Wil	P	Own	Nb-UP	1/2 Own	4.10	C
48	PontiacDeL.6,37-26CA		117	6.00/16	6-3 7/16 x4	28.3	222.7	85-3520	6.20		CI	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	1/2 Own	4.37	IC
49	Pontiac DeL.8,37-28A		122	6.50/16	8-3 1/4 x3 3/4	33.8	248.9	99-2800	6.20		CI	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	1/2 Own	4.37	IC
50	Studebaker Dict. 6		116	6.00/16	6-3 1/4 x4 3/8	25.4	217.8	90-3400	6.00		CI	Dia	Ly	Fram	AC	Str	Buf	A	Wil	P.B&B	WG	Ru-Th	1/2 Spi	4.55	C
51	Studebaker Dict. Pi.		116	6.00/16	6-3 1/4 x4 3/8	25.4	217.8	90-3400	6.00		CI	Dia	Ly	Fram	AC	Str	Buf	A	Wil	P.B&B	WG	Ru-Th	1/2 Spi	4.55	IT
52	Studebaker Pres.		125	6.50/16	8-3 1/16 x4 1/4	30.0	250.4	115-3600	6.50		Al	Dia	Ly	Fram	Bur	Str	Bur	D	Wil	P.Long	WG	Nb-Spi	1/2 Spi	4.55	IT
53	Terrap DeL.&Cus.6		117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25		CI°	Ge	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	1/2 Own	4.11	C
54	Willys 37		100	5.50/16	4-3 1/16 x4 3/8	15.6	134.2	48-3200	5.70		CI	LB	CI	No	AC	Til	Buf	A	USL	P.B&B	WG	m-UP	1/2 Own	4.30	C

ABBREVIATIONS

°—Others Used
†—Power Clutch 1/2—Semi-Floating
3/4—Three Quarters Floating
Al—Aluminum **Ala**—Anode-processed
Als—Aluminum Alloy with Strut
BS—Briggs & Stratton
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron
CS—Cast Steel
C—Conventional **dp**—Double Plate
f—Standard Coupe
FF—Full Floating
IC—Independent Coil
IKa—Independent Knee action
IT—Independent-Transverse
m—Metal **Ly**—Lynite
N—Negative
Nb—Needle Bearing
Os—Own Semi-centrifugal
Ot—Overdrive Transmission
P—(Clutch) Single Plate
Tu—Tubular **Tr**—Transverse
Var—Various
(t)—60-7.00/16, 65-7.50/16
(u)—60-3.69, 65-4.30
(v)—70-4.30, 75-4.60 (y)—At 2800RPM
(x)—At 1000RPM (z)—Or Champion

ABBREVIATIONS (Make of Units)

‡—Owen-Dyneto for Generator and Starter
††—Computed on a basis of displacement, gear ratio, effective tire diameter and weight with normal load

A—Autolite **AC**—AC Spark Plug
BA—Burgess or AC
B&B—Borg and Beck
BH—Bendix Hydraulic Operated
BM—Bendix Mechanical (Brakes)
BPH—Bendix Power Operated Hydraulic
Buf—Buffalo Pressed Steel
BO—Buffalo or Oldberg
Bur—Burgess **Car**—Carter
Ch—Champion **Col**—Columbia
CG—Chandler-Groves
D—Delco-Remy
DA—Delco Generator & Starter; Autolite Coil & Distributor
Del—Delco
Det—Detroit **Dia**—Diamond
DL—Detroit Lubricator Co.
Exi—Exide **Fle**—Fleming
G—Gemmer (Steering)
Han—Handy
HM—Hydraulic Mechanical
Ill—Illinois **LB**—Link Belt
LH—Lockheed Hydraulic (Brakes)
M—Midland Steeldraulic

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS No. and Width Comp.	RINGS No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES Head Diameter and Seat Angle Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C. No. of Degrees	No. of Flywheel Teeth	IGNITION Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing Spark Occurs °TC*	Spark Occurs No. of Flyw. Teeth	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
....	....	....	Ch-C-7....	3	1	....	F..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1½	1¼	..	6	.....	.....	.....	.....	1
BH.	R...	....	Ch-J-6....	2-⅛	1-⅛ 1-⅜	⅞	R..	1 9/16	30	1 11/32	45	.342	.010H	.010H	.012	7½B..	2¼B.	.018	.025	3B...	1B...	Au.	B.	2⅛	1¼	6	16	3½-4	1.5	⅛	7½	2
BH.	R...	....	Ch-J-6....	2-⅛	1-¼ 1-⅜	⅞	R..	1 9/16	30	1 11/32	45	.342	.010H	.010H	.012	7½B..	2¼B.	.018	.025	3B...	1B...	Au.	B.	2⅛	1¼	8	20	2-3	1.5	⅛	7½	3
BH.	R...	....	Ch-J-9....	2-⅛	1-⅛ 1-⅜	⅞	R..	1 9/16	30	1 11/32	45	.342	.010H	.010H	.012	7½B..	2¼B.	.013	.025	3B...	1B...	Au.	B.	2⅛	1¼	8	20	2-3	1.5	⅛	7½	4
OH.	S...	(g)	AC-H9....	2-3/32	2-3/16	13/16	R..	1 17/32	45	1 13/32	45	.375	.015H	.015H	††	13B...	4⅞	.015	.025	2B...	¾B..	Au.	A.	2	1 3/32	6	13¼	¼-±⅜	-¼, +1	0-1/16	3½-4½	5
OH.	S...	170x	AC-H9....	2-3/32	2-1/16	⅞	R..	1 17/32	45	1 7/16	45	.375	.015H	.015H	††	14B...	6	.015	.025	10B..	4½B.	Au.	A.	2¼	1⅜	8	17	¼-±⅜	-¼, +1	0-1/16	3½-4½	6
OH.	S...	145x	AC-H9....	2-3/32	2-1/16	⅞	R..	1 17/32	45	1 7/16	45	.375	.015H	.015H	††	14B...	6	.015	.025	10B..	4½B.	Au.	A.	2¼	1⅜	8	17	0-±⅜	-¼, +1	0-1/16	4½-5½	7
OH.	S...	154x	AC-H9....	2-3/32	2-3/16	⅞	R..	1 17/32	45	1 7/16	45	.375	.015H	.015H	††	14B...	6	.015	.025	10B..	4½B.	Au.	A.	2¼	1⅜	8	17	0-±⅜	-¼, +1	0-1/16	4-5	8
BH.	S...	....	AC-K7....	2-⅛	2-5/32	⅞	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2¼B.	Ad.	A	2.46	2½	7	25	(c).....	(d)	0-1/16	(e)...	9
BH.	S...	....	AC-K7....	2-⅛	2-5/32	⅞	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2¼B.	Ad.	A	2.46	2½	7	25	0-±¼	0-½	0-1/16	5°38′	10
BH.	S...	....	AC-G7....	3-3/32	1-3/32	⅞	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.021	.025	10B..	3B...	Ad.	B	2½	2¼	9	17	0-±¼	0-½	0-1/16	5°38′	11
OP.	S...	....	AC-G6....	3-3/32	1-3/32	⅞	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.016	.025	4B...	1¼B.	Ad.	B.	2½	2¼	10	24	0-±¼	0-½	0-1/16	4½	12
OH.	O...	112	AC-K11...	2-⅛	1-3/16	⅞	R..	1 41/64	30	1 15/32	30	11/32	.006H	.013H	.006	9B...	3¼B.	.020	.040	5B...	1¾B.	Au.	A.	2 1/16	1 1/16	5	14	2¾±½	1±½	1/16-⅛	7°10′	13
OH.	O...	112	AC-K11...	2-⅛	1-3/16	⅞	R..	1 41/64	30	1 15/32	30	11/32	.006H	.013H	.006	9B...	3¼B.	.020	.040	5B...	1¾B.	Au.	A.	2 1/16	1 1/16	5	14	0	¼-¾	1/16-⅛	7¾	14
LH.	G...	155x	Ch-J-8....	2-⅛	2-5/32	43/64	F..	1 21/64	45	1 17/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	¾A..	Au.	A.	2⅛	1¼	5	20	1½	†	0-1/16	4½-6	15
LH.	G...	155x	Ch-H-10...	2-⅛	2-5/32	43/64	F..	1 13/32	45	1 13/32	45	.340	.006H	.010H	.011	2B...	¾B..	.018	.025	3A...	1¼A.	Au.	A.	2 3/16	1⅜	6	22	1½	†	0-1/16	4½-6	16
LH.	G...	150x	Ch-H-10...	2-⅛	2-5/32	43/64	F..	1 13/32	45	1 13/32	45	.340	.006H	.010H	.011	2B...	¾B..	.018	.025	5A...	2A...	Au.	A.	2 1/16	1⅜	6	21	2	†	0-1/16	4¾-6	17
LH.	G...	150x	Ch-H-10...	2-⅛	2-5/32	43/64	F..	1 15/32	45	1 15/32	45	.340	.006H	.010H	.011	2B...	¾B..	.018	.025	5A...	2A...	Au.	A.	2 1/16	1⅜	6	17	2	¼-¾	0-⅛	4½-5½	18
LH.	G...	110	Ch-J-9....	2-3/32	2-3/32	⅞	F..	1 29/64	30	1 23/64	45	.342	.009	.009	.016	7½B..	19B..	.015	.025	3B...	1¼..	Au.	A.	2	2⅝	7	28	1-2½	1	0-1/16	6	19
LH.	.....	155x	Ch-J-8....	2-⅛	2-5/32	43/64	F..	1 21/32	45	1 11/32	45	.340	.008H	.010	.014	TC...	TC...	.020	.025	2A...	¾A..	Au.	A.	2⅛	1¼	5	20	1½	†	0-1/16	4½-6	20
LH.	.....	140x	Ch-J-8....	2-⅛	2-5/32	43/64	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A...	2½A.	.020	.025	4A...	1½A.	Au.	A.	2 1/16	1	5	16	2	¼-¾	0-1/16	4½-5½	21
PH.	R...	....	Ch-6M....	3-1/16	1-3/16	1 1/16	F..	1½	30	1 1/16	30	11/32	.015C	.015C	.025	6B....	2B....	.021	.025	1½ "B"	.....	Ad.	..	2 1/16	1¾	12	32	3	1	¼	.....	22
OM	O...	150y	Ch-H-10..	2-3/32	1-5/32	.687	F..	1.28	45	1.28	45	.279	.013C	.013C	.013	9½B..	.....	.015	.025	4B...	.....	Au.	..	1.60	1.54	4	15.2	8	1	1/16-⅛	8	23
OM	O...	100	Ch-7.....	2-3/32	1-5/32	.750	F..	1 11/32	45	1 11/32	45	.310	.013C	.013C	.013	9½B.	3B...	.015	.025	4B...	1¼B.	Au.	A.	2	1 11/16	5	22	8	1	1/16-⅛	8	24
OH.	R...	....	Ch-7.....	2-3/32	1-1/16 1-3/16	13/16	R..	1 23/64	30	1 13/64	45	5/16	.010H	.010H	.012	4½B..	1½B.	.018	.025	2B...	¾B..	....	A.	1 13/16	1⅛	5	11	4½-5½	1	1/16-⅛	7½	25
OH.	R...	....	Ch-J-9....	2-3/32	1-3/32 1-3/16	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	2A....	¾A..	.018	.025	TC...	.....	....	A.	2 1/16	1⅛	5	15	4-4½	1	1/16-⅛	7½	26
OH.	R...	....	Ch-J-9....	2-3/32	1-3/32 1-1/16	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	4½B..	1½B.	.018	.025	4A...	1½A.	....	A.	2 1/16	1⅛	5	15	3-4	1	1/16-⅛	7½	27
OH.	R...	....	Ch-J-9....	2-3/32	1-5/32	13/16	R..	1 23/64	30	1 21/64	45	5/16	.010H	.010H	.012	4½B..	1½B.	.018	.025	4A...	1½A.	....	A.	2 1/16	1⅛	5	15	3-4	1	1/16-⅛	7½	28
BH.	G...	80	Ch-J-8....	2-3/32	2-3/16	¾	F..	1⅜	45	1⅜	45	3/8	.008	.010	....	10⅝B.	4B....	.020	.022	BC...	BC...	Au.	A	1 13/16	1⅜	5	13	0-½	1-1½	0-1/16	7	29
BH.	G...	.....	Ch-H-10..	2-3/32	2-1/16	¾	F..	1½	45	1⅝	45	3/8	.008	.010	....	10⅝B.	4B....	.020	.022	BC...	BC...	Au.	A	1 13/16	1⅜	7	20	.....	1-1½	0-⅛	7	30
BH.	S...	155x	AC-K7....	2-⅛	2-5/32	⅞	F..	1⅞	45	1⅝	45	.341	No....	No....	No..	TC...	TC...	.015	.026	5B...	2¼B.	Ad.	A.	2 13/16	2 3/32	7	25	¼-1	¼-1	0-1/16	4°-51′	31
OM	O...	....	Ch-J-9....	2-3/32	1-5/32	....	....	1.54	45	1.54	45	.311	.....	.....	....	.....	.....	.015	.029	.....	.....	....	..	2 1/16	....	6	27	4	¾	1/16-⅛	.....	32
M..	O...	105	Ch-7.....	2-⅛	2-5/32	⅞	P..	1 11/16	45	1 11/16	45	5/16	.004C	.006C	.004	21B...	6¾B.	.020	.022	7B...	2¼B.	Au.	B.	2½	1	12	32	1½	1	1/16-⅛	7½	33
BH.	G...	100	AC-K-7...	2-⅛	2-5/32	⅞	F..	1¾	45	1 13/32	45	.372	.008H	.015H	.008H	24B...	.....	.022	.027	4Bm.	.....	Au.	A.	2	1 27/64	7	17	2½	1½	⅛	7	34
BH.	G...	.90	AC-K-7...	2-⅛	1-⅛ 1-3/16	⅞	F..	1 23/32	45	1 13/32	45	.372	.008	.015H	.008	15B...	.....	.020	.027	9Bm.	.....	Au.	B.	2	1 13/32	7	18	2	1½	⅛	7	35
BH.	G...	100	AC-G8....	2-⅛	2-5/32	⅞	F..	1 23/32	45	1 17/32	45	.340	.015	.015	.015	5A....	.....	.022	.025	DC..	3B...	Au.	A.	2	1 27/64	6	20	2½	1½	⅛	7	36
BH.	S...	.....	AC-K9....	2-⅛	2-1/16	43/64	P..	1 1/16	30	1 21/64	45	11/32	.008H	.011	.012	5B....	2B....	.020	.040	TC...	TC...	Au.	A.	2½	1⅜	6	16	¼-1	⅛-1	1/16-⅛	4°51′	37
BH.	S...	.....	AC-K9....	2-⅛	2-1/16	43/64	P..	1 1/16	30	1 21/64	45	11/32	.008H	.011	.012	TC...	TC...	.015	.030	2B...	¾B..	Au.	A.	2⅛	1⅜	7	20	¼-1	⅛-1	1/16-⅛	4°51′	38
H...	O...	110	AC-Y4 (z).	2-⅛	1-⅜	⅞	F..	1.57	30	1.40	45	.340	.007H	.010H	....	5B....	.....	.015	.025	4B...	.....	Au.	..	2 3/32	1¼	7	17	2½±½	1±¼	1/16±1/16	1½	39
H...	O...	110	AC-Y4 (z).	2-⅛	1-⅜	⅞	F..	1 13/32	30	1 13/32	45	.340	.007H	.010H	....	5B....	.....	.015	.025	7B...	.....	Au.	A.	2 3/32	1¼	7	20	2½±½	1±¼	1/16±1/16	1½	40
H...	O...	110	AC-Y4 (z).	2-⅛	2-5/32	⅞	F..	1 13/32	45	1 13/32	45	.340	.004H	.006H	....	30B...	9¾B.	.015	.025	6B...	.....	Au.	B.	2 3/32	1 3/32	8	24	2½±½	1±¼	1/16±1/16	1½	41
BPH	O...	110	AC-Y4 (z).	2-⅛	2-5/32	⅞	F..	1 41/64	45	1 21/64	45	.340	AA...	AA...	....	TC...	TC...	.020	.025	6B...	.....	Au.	B.	2½	2¼	10	40	(b)	1-±¼	1/16±1/16	1½	42
Ste.	R...	80	Ch-J-6....	2-⅛	1-⅜	⅞	F..	1 21/32	45	1 9/16	45	.372	AA...	AA...	.010	5A....	1½A.	.018	.025	2B...	½B..	Ad.	A.	2¼	1¼	10	25	¾	1	1/16	8	43
Ste.	R...	85	Ch-J-6....	2-⅛	1-⅜	⅞	F..	1 21/32	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1½B.	Ad.	A.	2¼	1⅛	11	38	¾	1	1/16	8	44
Ste.	R...	85	Ch-J-6....	2-⅛	1-⅜	⅞	F..	1 21/32	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1½B.	Ad.	A.	2½	1⅛	11	38	¾	1	1/16	8	45
LH.	.....	145x	Ch-J-8....	2-⅛	2-5/32	43/64	F..	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A...	2½A.	.020	.025	4A...	1½A.	Au.	A.	1 13/16	1	5	15	1-3	¼-¾	0-1/16	4½-5½	46
LH.	.....	145x	Ch-J-8....	2-⅛	2-5/32	43/64	F..	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A...	2½A.	.020	.025	4A...	1½A.	Au.	A.	1 13/16	1	5	15	1-3	¼-¾	0-⅛	4½-5½	47
BH.	S...	.141	AC-K7....	2-⅛	1-3/16	15/16	R..	1 19/32	30*	1 13/32	45	.310	.012H	.012H	.015	5B....	2B....	.020	.025	4B...	1½B.	Au.	A.	2	1⅞	6	16	N1-N1¼	¾-1¼	0	4½-5	48
BH.	S...	.....	AC-K7....	2-⅛	1-3/16	15/16	P..	1 19/32	30	1 13/32	45	.310	.012H	.012H	.015	5B....	2B....	.018	.025	4B...	1½B.	Au.	A.	2	1⅛	7	19	N1-N1¼	¾-1¼	0	4½-5	49
LH.	R...	105	Ch-8.....	2-⅛	1-⅜	⅞	R..	1 45/64	45	1 9/32	45	11/32	.016C	.016C	.020	15B.....	.....	.020	.025	2B...	.....	Au.	A.	2 3/16	1⅜	5½	13	1½	1½	1/16-⅛	9½	50
LH.	R...	105	Ch-8.....	2-⅛	1-⅜	⅞	R..	1 45/64	45	1 9/32	45	11/32	.016C	.016C	.020	15B.....	.....	.020	.025	2B...	.....	Au.	A.	2 1/16	1⅜	5½	13	(a)	½	1/16-⅛	5½	51
LH.	R...	....	Ch-8.....	2-⅛	1-⅜	⅞	R..	1 13/32	45	1 9/32	45	11/32	.016C	.016C	.020	15B.....	.....	.020	.025	TC...	TC...	Au.	A.	1⅞	1 1/16	8	15½	(a)	½	1/16-⅛	5½	52
BH.	G...	....	Ch-J-8....	2-3/32	2-3/16	¾	F..	1⅜	45	1⅜	45	3/8	.008	.010	....	10⅝B.	4B....	.020	.022	BC...	BC...	Au.	A.	1 13/16	1⅜	5	12½	0-½	1-1½	0-1/16	7	53
BM.	G...	87	Var.18mm.	3-3/32	1-3/16	15/16	F..	1 17/32	45	1 13/32	45	.371	.004H	.006H	.010	TC...	TC...	.018	.025	4A...	1A...	Au.	A.	1 13/16	1 1/16	4	11	3	2	3/32	7½	54

m—Midland
Mar—Marvel
Mor—Morse
Nat—National
Nb—Needle Bearing
NS—Noblitt Sparks **O**—Own
OH—Own Hydraulic
OM—Own Mechanical
OP—Own, Power Operated
Old—Oldberg
PD—Presto Lite or Delco
Pur—Purolator
R—Ross
S—Saginaw
SC—Stromberg or Carter
Spi—Spicer
Ste—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson **Tim**—Timken
UP—Universal Products
Wal—Walker
WG—Wagner Gear Co.
Whit—Whitney **Wil**—Willard

ABBREVIATIONS

†—(−¼ to+½)
‡—7/16±1 (a)—(−¼ to+½)
*—Measured on rim of flywheel
A—After
A—Above (Rod removal)
AA—Automatic Adjuster
Ad—Advanced
Au—Automatic
(b)—(0° to−½)
B—(Valve and Ignition timing)—Before
B—Below (Rod removal)
Bm—Before Marks on Vibration Dampener
BC—Bottom Center
C—Cold (Tappet clearance)
(c)—60, ¼—1; 65, 0—±¼
(d)—60, ¼—1; 65, 0—½
(e)—60—4° 51′; 65—5° 38′
F—(Pin locked in) Floating
(g)—60—155x, 65—170x
H—Hot
Ma—Manual **N**—Negative
O—Out only
P—(Pin locked in) Piston
R—(Pin locked in) Rod
Re—Retarded
Ru—Rubber
RZ—Rzeppa (Gear Grinding Machine Co.)
S—Slides—Sectors **TC**—Top Center
Var—Various
††—With clearance of .015 the valve is .004 off its seat.

Use Proper Water Pump Lubrication

(Continued from page 29)

All kinds of water pump greases are available. They contain everything from tallow to rubber latex. They vary in color through various shades of straw, yellow, orange, red, blue, green and black. They have consistencies from Camembert to imported Swiss — or in other words, some of them are soft enough to handle with a spoon, and others are hard enough to be carved into statues. Most of them do have one characteristic in common — they are either perfumed, or they smell like Limberger.

Adding to the load of grief carried by the service station is the matter of car manufacturers' recommendations. One maker suggests the use of gear oil in the water pump of his car simply because he equips it with a lubrication fitting and feels that it will be more convenient to shoot it with the power gun. In this pump the lubricant comes in contact with the water, and gear oil immediately gets in the cooling system.

Some makers design their pumps to use engine oil, which avoids the grease problem, but it is difficult to keep the oil out of the radiator.

One maker uses both oil and grease type pumps in production. He recommends chassis lubricant in the grease type pump because he fears that the exceedingly stiff type of water pump grease will be used in some cases and retard the action of the spring-loaded packing, thus causing the pump to leak. Chassis lubricant is soft enough for the spring construction but it gets in the cooling system and causes overheating. Another difficulty exists also, as chassis lubricant is ordinarily carried in the power gun, and a careless application of this high-pressure bursts the pump housings.

All of which adds up to exactly nothing but trouble for service stations. What is the remedy? There are two possible remedies:

1—Standardization of water pump design plus standardization of water pump lubricants, or—

2—A water pump that requires no lubrication.

Until that time comes select your water pump grease according to the type of pump and the conditions of operation to be met.

You had no warning that these kids would pop up here . . . and there'll be no more warning than that when they scoot in front of your car. For split-second stops, when inches make all the difference in the world, put your trust in AMCO Brake Lining.

Amco BRAKE LINING

ASBESTOS MANUFACTURING CO., HUNTINGTON, IND.

Lou Brown Killed

Louis Brown, hard riding corn belt racing driver, and leader in the 1936 Atlantic States Auto Racing points standing was killed instantly during a time trial Dec. 6 at Savannah, Ga.

Lightning Lou as he was often billed had been broadsiding the country's dirt tracks for the past 10 years. A native of Champaign, Ill., Brown was the owner of a Dryer Special and he campaigned the dirt ovals from coast to coast. Brown was 29 and leaves a young widow whom he married last June.

The winter of 1935-1936 found Brown conducting the Montgomery Ward safety campaign along with IMCA dirt track champion Gus Schraeder. Last spring Brown set a track record at Portland, Ore. During the past summer Brown drove under the International Motor Contest Association colors, participating in races at many of the leading fairs and expositions that were under the promotion of J. Alex Sloan. After a successful season at the IMCA fair races Brown joined the ranks of the Atlantic States Auto Racing Association, an organization conducting races in the Carolinas, Georgia and Florida. Brown's spectacular driving soon put him in position to claim enough points to cinch the 1936 ASARA title. During his racing career Brown had also driven in numerous AAA races throughout the Mid-West.

Why be Satisfied with a Substitute?

When today you can buy America's Finest Automotive Alignment Equipment made by the originators of Precision Alignment Equipment at no extra cost.

The first alignment systems for the handling of all phases of wheel alignment, frame and axle straightening, were placed on the market by the BEE-LINE MFG. COMPANY.

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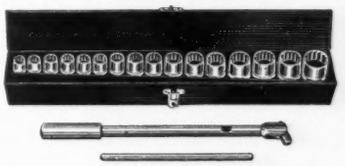

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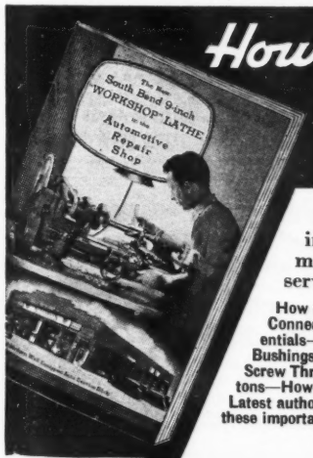
Compact set of 16 plated and polished 'CV' Chrome-Vanadium steel double-hexagon Sockets, 7/16" to 1¼" and 15" Hinge Handle with cross handle, in enameled metal box. Ask your Jobber, or write for Catalog "A." Bonney Forge & Tool Works, Allentown, Pa.

How to do—

9 MAJOR AUTO SERVICE JOBS



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How to Grind Valves—How to Bore Rebabbited Connecting Rods—How to Test and True Differentials—How to Machine Flywheels—How to Make Bushings—How to True Armatures—How to Cut Screw Threads—How to Finish Pistons—How to True Brake Drums. Latest authoritative methods for doing these important jobs.

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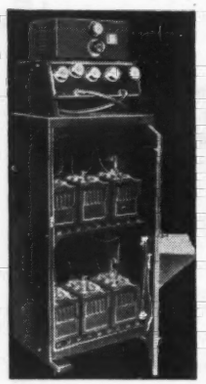

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Requires only 3 square feet of floor space.

Completely wired in conduit with necessary charging jumpers furnished, also battery carrier.

Batteries on charge are completely hidden from view, making it an attractive, impressive looking sales unit.

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50% Discount on Initial Order if You Mention Jobber's Name.
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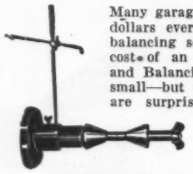

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Eyston Plans Attack On Campbell's Record

(*Continued from page 43*)

promising of English aspirants for the title which Campbell holds. For two years now Eyston has made annual pilgrimages to the United States and the Bonneville Saltbed in search of new racing records of speed and endurance. In 1935 he was successful in his quest and again in 1936 he astounded the racing world when he established 113 new records with his powerful "Speed of the Wind" car. Many of those records have since been bettered by John Cobb, another Englishman and Ab Jenkins, America's record king.

Jenkins also has been named as a likely contender for the straightaway record which Eyston will seek this year, but to date he is not known to have made definite application for official recognition. It is whispered in speed circles that Jenkins, too, might challenge the Campbell title this year.

Free Booklet and Wall Chart

The McQuay-Norris Mfg. Co., Cooper & Southwest Aves., St. Louis, Mo., has released the second edition of a booklet entitled "Oil Trouble—It's not the things you do that cause Failure . . . It's the things you Don't do." This booklet is written by D. M. Smith, Engineer, and clearly sets forth the various causes of excessive oil consumption, and when due to poorly fitted rings, gives the recommended combinations of McQuay-Norris rings, to correct the condition. The booklet contains 44 pages and 45 illustrations, and presents the subject in a clear, concise manner. In conjunction with this booklet, an attractive wall chart has been prepared, which is intended to assist the service man in explaining the existing condition to the car owner and in selling the necessary repair job. Copies of the booklet and the wall chart will be sent free upon request.

Glorifying Super Service

(*Continued from page 21*)

on the windows, steeled tubed furniture, radio, smoking stand and dressing table. This rest room has been quite an attraction to our women customers during the hot summer months. They may read or rest in perfect comfort while their cars are being lubricated, washed or the tires or oil changed. Women now don't mind waiting while their cars are serviced, and by thus waiting they are deprived of the car's use only a minimum of time.

"An additional feature of our station is a drive-in space under cover in the rear of our building devoted to washing, lubrication, repairs and tire changing. This keeps the front unobstructed and enables us to better service fast moving customers, especially gas and oil patrons. This plan also enables us to keep the front cleaner. Some 1500 gas and oil customers pass through our station daily.

"Other equipment added in our remodeling included a four-ton lift, and all new lubricating equipment. Our new service truck has a built-in air compressor and equipment includes a 20-ton jack, used in changing truck tires. All of this has added to our efficiency and to the satisfaction of our customers with our service."

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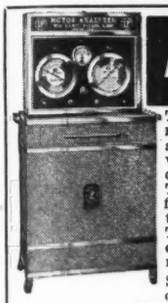
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Los Angeles Race Postponed

(*Continued from page 41*)

optimistic in the belief that the track would be ready sometime during 1937, "probably for a late fall opening date," he said.

Work toward completion of the Raceway would be continued uninterrupted.

The site of the new track was recently moved to 430 acres adjacent to Long Beach Airport between Los Angeles and Long Beach, along an arterial highway. The original plans called for the track's construction within Los Angeles.

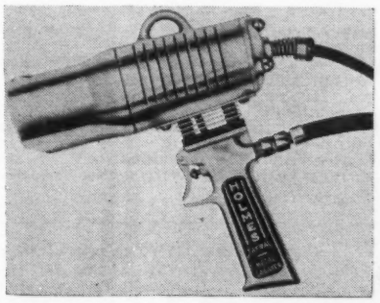
The Pacific Coast road racing course, designed as the nation's second link in a chain of major Raceways, will be 3.003 miles in length when completed. Like Roosevelt Raceway at Westbury, Long Island, it will be hard surfaced but will not contain the many curves which slowed the speed of the original George Vanderbilt Cup classic on Oct. 12. A long sweeping curve on each end of two long straightaways comprise the Los Angeles Raceway, according to the design approved at this time.

Change in plans for the Los Angeles Raceway takes the 1937 season's opening to the important 500-Mile International Sweepstakes at the historic Indianapolis Speedway on Decoration Day. The "500" will be held on Monday, May 31 this year in view of the fact that Decoration Day falls on Sunday.

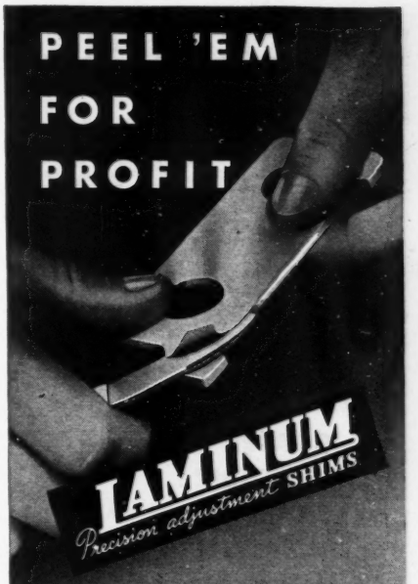
The difficulties with Los Angeles Raceway will have no effect upon the 1937 season's schedule of the Roosevelt Raceway, automobile racing officials assure. Two events are already on the International Sports Calendar for Roosevelt Raceway in 1937. They are: The Pan-American Cup Race on July 5, and the 400-Mile George Vanderbilt Cup Sweepstakes on Sept. 6.

Solder Spray Gun Announced by Holmes

Ernest Holmes Co., 700 East Main Street, Chattanooga, Tenn., has announced a new solder spray gun which



is supplied complete with cord, plug, tinning compound, cleaning cloth, wire brush and specially-prepared spraying solder, and which sells for $39.50. Will spray solder on steel or aluminum without heating the body surface, and does the job quickly and smoothly, with considerable saving of time. Has self-cleaning nozzle, protected against damage by rough handling. Consumes 300 watts, and weighs only 2 lb.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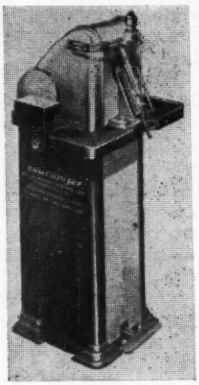
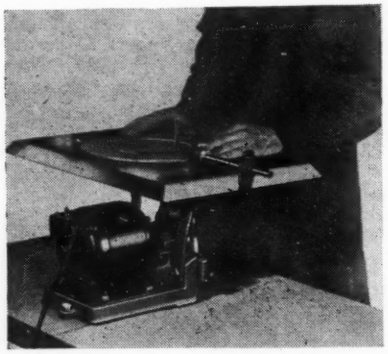
Ramco Announces New Piston Resizer



Ramsey Accessories Mfg. Corp., 3693 Forest Park Blvd., St. Louis, Mo., has developed a new piston resizer machine known as "Ramconizer." It consists of an automatic trip-hammer driven by a quarter-horsepower motor. Hammer control is by means of a large foot pedal at the base of the machine, and action can be controlled to deliver either light taps or blows heavy enough to expand the thickest truck piston even when reinforced by struts. Blows are directed upon the inside of the piston skirt, and expansion up to 0.008 in. can be obtained. The machine will handle cast iron pistons as well as aluminum alloy pistons.

Cut Your Own Odd-Size Facings

The replacement trade is now offered a means of supplying odd-size clutch facings to order without the necessity of carrying an excess stock. The Asbestos Mfg. Co., Huntington, Ind., is now supplying clutch facing Slabstock in eight different sizes varying in area and thickness. It is also supplying a small power saw, called the AMCO SLAB slitter, with



a saber-type blade for the express purpose of cutting clutch facings from the Slabstock. The machine is powered with a ¼ hp. electric motor, single phase, 60 cycle, 110 volts, and is priced at $46.25 f.o.b. Chicago. A folder entitled "Cats and Dogs in Clutch Facings Can Be Profitable," describing the material available and the specifications of the saw, may be had by writing the Asbestos Mfg. Co.

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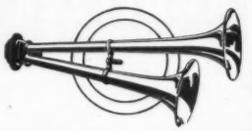

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